# SERVICE MANUAL

# AUTO VARI-64

## ACCESSORY MODEL

HO 1290 974

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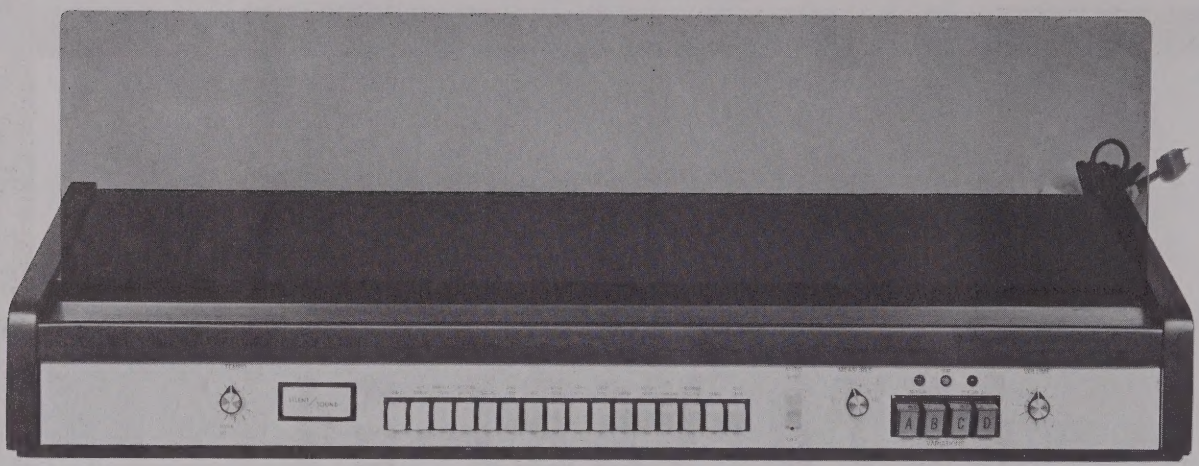



ACCESSORY MODEL AUTO VARI - 64

# TABLE OF CONTENTS

## SECTION I - HOW THE AUTO VARI - 64 OPERATES


| | | Page |
|---|---|---|
| 1- 1 | General | 1- 1 |
| 1- 2 | Sixteen Rhythm Patterns | 1- 1 |
| 1- 3 | Variation Switches - A,B,C, and D | 1- 1 |
| 1- 4 | Automatic Variation Control Switch | 1- 1 |
| 1- 5 | Silent/Sound Rocker Switch | 1- 1 |
| 1- 6 | Foot Switch Input | 1- 1 |
| 1- 7 | Tempo Control | 1- 2 |
| 1- 8 | Volume Control | 1- 2 |
| 1- 9 | Beat Indicator Lamps | 1- 2 |
| 1-10 | Balance Control (Accessory Model Only) | 1- 2 |
| 1-11 | Four Play Along Voices | 1- 2 |
| 1-12 | Auto-Accompaniment | 1- 2 |
| 1-13 | Continuous Touch Start Switch | 1- 2 |
| 1-14 | Foot Switch Reset | 1- 2 |


## SECTION II - DISASSEMBLY AND MAINTENANCE


| | | |
|---|---|---|
| 2- 1 | General | 2- 1 |
| 2- 2 | Removal of Music Panel | 2- 1 |
| 2- 3 | To Gain Access to AutoVari Chassis Assembly | 2- 1 |
| 2- 4 | Removal of Auto-Vari Chassis Assembly | 2- 1 |
| 2- 5 | Removal of Variation Board (124-000418) | 2- 1 |
| 2- 6 | Removal of Generator Board (124-000379) | 2- 1 |
| 2- 7 | Removal of Voicing Board (124-000380) | 2- 1 |
| 2- 8 | Removal of Back Panel | 2- 2 |
| 2- 9 | Removal of Control Panel | 2- 2 |
| 2-10 | Switches and Reassembly | 2- 2 |
| | Test and Adjustment Procedure | 2- 3 |
| | Test and Adjustment Procedure | 2- 4 |


## SECTION III - DIAGRAMS AND TEXT


| | | |
|---|---|---|
| 3- 1 | General (See List of Illustration ii) | 3- 1 |


## SECTION IV - ILLUSTRATED PARTS LIST


| | | |
|---|---|---|
| 4- 1 | Index | 4- 1 |


Appendix (Not Included At This Time)


| | | |
|---|---|---|
| | Appendix Index | A- 1 |

# LIST OF ILLUSTRATIONS

## AUTO VARI-64-ACCESSORY


| Figure | | Page |
|---|---|---|
| | General and List of Illustrations . . . . . | 3- 1 |
| 3- 1 | Logic Diagram Auto Vari-64 Accessory Model . . . . . | 3- 2 |
| 3- 2 | Theory of Operation Auto Vari -64 (Sheet 1 of 2) . . . . . | 3- 3 |
| 3- 3 | Theory of Operation Auto Vari -64 (Sheet 2 of 2) . . . . . | 3- 4 |
| 3- 4 | Pattern Generator Board-Schematic and Layout . . . . . (124-000379) . . | 3- 5 |
| 3- 5 | Voicing Board-Schematic and Layout . . . . . (124-000380) . . | 3- 6 |
| 3- 6 | Variation Board-Schmatic and Layout . . . . . (124-000418) . . (Early Model 124-000384) . . | 3- 7 |
| 3- 7 | Rhythm Tracks and Variation Chart . . . . . | 3- 8 |

# SECTION I
# HOW THE ORGAN OPERATES

AUTO VARI 64

I-1 GENERAL --This section briefly describes the features and various functions of the Auto Vari Units. There are basically two models:

1. The Accessory Model: A self contained unit, with its own power source, but does require an external amplifier and speaker. It does not have the Auto-Accompaniment feature or play along voices.

2. The In-build Version: Is assembled into and part of the completed organ. It has the added features of Auto-Accompaniment and the play along voices. Though the Rhythm Units and functions are identical in each organ model it is used, the control panel and mountings will differ due to cabinet styling and color.

The Auto Vari is comprised of the following features:

I-2 16 RHYTHM PATTERNS-- The 16 Rhythm patterns are controlled by 16 interlocking push bottons which can be depressed singularly or in two or three pattern combinations. Two of the 16 buttons select 3/4 time rhythm patterns, the other fourteen buttons select 4/4 time rhythm patterns.

I-3 VARIATION SWITCHES A,B,C,D -- There are four lighted variation switches which select any one of four variations of the sixteen rhythm patterns.

I-4 AUTOMATIC VARIATION CONTROL SWITCH The above mentioned variations can be activated automatically by setting the Auto Vari Switch to any of the six measure rates. If the measure rate knob is placed in the "2" position, every 2 measures, a new variation will be selected automatically in an A,B,C, and D sequence. There are 6 positions, 1/2,1,2,4,8 and 16.

I-5 SILENT/SOUND ROCKER SWITCH This is the primary control for the Rhythm Unit. When Rocker Switch is in the silent position, the automatic Rhythm pattern cannot be heard, but the play along voices such as; Brush and Snare Drum for the lower manual and Cymbal and Bass Drum for the pedal can be heard. When in the Sound position, the automatic Rhythms will sound, starting with beat one at measure one.

I-6 FOOT SWITCH INPUT--A foot switch jack is provided on the rear of the accessory model for installing a foot control switch. Input circuitry will allow the rhythm voices to be silenced if foot switch is in "off" position. If switch is put in the "on" position rhythm patterns will sound, reset to beat one of measure one.

I-7 TEMPO CONTROL--This control is used to vary the tempo of the rhythm patterns to suit the player. The tempo rate can be varied from 12 to 75 measures per minute. (On In-build models the tempo control also varies the rate of the Auto-Accompaniment output signal).

I-8 VOLUME CONTROL--This full range volume control varies the rhythm voice from silent to maximum output. (On In-Build models this control allows the rhythm patterns to be silenced so that only the Auto-Accompaniment can be played without hearing the rhythm pattern).

I-9 BEAT INDICATOR LAMPS--The three lamps display the tempo and measure of the rhythm unit. The two red lamps are for measure I and measure II and are "on" during the complete measure. A yellow lamp is used as a "Tempo" light and flashes three times per measure for Waltz and 6/8 March rhythm patterns, and 4 times per measure for all other rhythm patterns.

I-10 BALANCE CONTROL (ACCESSORY MODEL ONLY)--Mounted on the rear panel of the unit. This control has a center detent. The control is used to adjust the high and low frequency content of the output signal. This adjustment may be necessary to compensate for different sound systems or room acoustics.

Following features pertain to the In-Build model only.

I-11 FOUR PLAY ALONG VOICES--These voices are activated by slide switches on the control panel. They are Brush and Snare Drum, triggered by the lower manual, and Cymbal and Bass Drum, triggered by the pedals. With any or all of the voices "on" and the silent sound switch in the silent position, the automatic rhythm patterns will not be heard, but the play along voices will sound.

I-12 AUTO-ACCOMPANIMENT--Bass notes and chords are gated by the rhythm unit to the main audio channel in automatic patterns and tempo, along with regular rhythm voices. Depressing lower manual keys or pedals will activate the pedal chord rhythms.

I-13 CONTINUOUS TOUCH START SWITCH--With switch in the "Touch Start" position and the "sound" tab depressed, the rhythm patterns will start with beat one of measure one, when either a lower manual key or pedal is depressed. To reset touch start mode, momentarily depress tab to silent, then back to "sound" position.

I-14 FOOT SWITCH RESET--With Foot Reset Switch in the "on" position, activating the foot switch on the organ swell control will reset the touch start mode, if continuous touch start switch is in the "on" position. When "Foot Switch Reset" is in the "off" position, and swell foot switch activated, the rhythm voices will be silenced, but the rhythm pattern generator will continue to run. Releasing the foot switch will allow rhythm patterns to sound without resetting to beat one of measure one.

# SECTION II
# DISASSEMBLY AND MAINTENANCE

AUTOVARI - 64 - ACCESSORY

DISASSEMBLY

2-1 GENERAL.--This section describes a main disassembly sequence and procedures for removal of specific assembly. The removal of some subassemblies is obvious. These will not be discussed.
For reassembly, use reverse procedures.

2-2 REMOVAL OF MUSIC PANEL.--The panel fits down into slot in AutoVari top assembly. By lifting up and to the rear, remove panel.
Handle panel with care and protect surface from being scratched.

2-3 TO GAIN ACCESS TO AUTOVARI CHASSIS ASSEMBLY.--Turn AutoVari over, resting top of case on soft carpet like surface to avoid scratching or marring of finish.
Remove four (4) screws from bottom panel.
Lift panel off.

2-4 TO REMOVE AUTOVARI CHASSIS ASSEMBLY FROM CABINET OR CASE.--With firm steady pressure pull volume, tempo and measure knobs from front of AutoVari assembly, also in similar action remove slide switch knob.
Remove three (3) hex head screws (each side) holding AutoVari chassis assembly to brackets mounted on cabinet (case).
Slide chassis slightly to the rear, giving access to the three (3) beat lites (LED).
From rear of control panel, carefully slide black plastic collars back onto the diode leads.
From front of control panel push back on lites and loosen lamps and lead from control panel.
Lites are now hanging loosely from AutoVari chassis.
Complete AutoVari chassis will lift out.

2-5 REMOVAL OF VARIATION (124-000418) BOARD FROM AUTOVARI CHASSIS.--Unplug edge connector from rear of variation board.
Turn AutoVari chassis over and remove three (3) hex screws, (from top side of chassis) holding variation board, add push-buttons to chassis.
Release spring clips holding board and lift out.
Variation buttons can be removed by pulling forward and off. By removing two (2) slot head screws escutcheon (frame around variation push-buttons) can be removed, leaving switches and printed wiring board as an assembly.

2-6 TO REMOVE PATTERN GENERATOR BOARD (124-000379).--Unplug edge connectors from generator board.
Remove escutcheon (Plastic frame around rhythm pattern push-buttons) by a steady forward pull at each end.
With escutcheon removed, locate small hex head screw at each end of push-button bracket, remove screws.
Release spring clips holding board, printed wiring board and button assembly should liftout.

2-7 TO REMOVE VOICING BOARD (124-000380).--Unplug edge connector from right side of board.
Release the four (4) spring clips holding board.
Slide board slightly to the right, just

enough to give clearance of chassis lip.
Lift up and to the left and remove board.

2-8 REMOVAL OF BACK PANEL.--Remove three (3) hex head screws mounting metal back panel to Auto-Vari chassis assembly. Care should be taken not to lose spacers used between back panel and chassis assembly.

2-9 REMOVAL OF CONTROL PANEL.--Remove three (3) hex screws (each side) mounting brackets and control panel to cabinet.

2-9 CONTINUED--By removing above screws, brackets and control panel should lift out of cabinet.
Remove two (2) screws each end holding control panel to brackets. Control panel and brackets will separate.

2-10 REMOVAL OF SLIDE SWITCHES AND POTENTIOMETER.--is quite obvious and will not be discussed.

FOR REASSEMBLY, USE REVERSE PROCEDURE.

NOTES

# TEST AND ADJUSTMENT PROCEDURES

## AUTO VARI 64 - ACCESSORY

| STEP TEST AND TEST POINT | DEPRESS TAB | PLAY KEY (S) | ADJUST | OSCILLOSCOPE OR INDICATION | FIG. |
|---|---|---|---|---|---|
| 1. HIGH FREQ. ADJUST | | | | | |
| 1(a) Test Point at Auto Vari Output Jack.<br><br>(Monitor by using external amplifier and speaker. | 1(a) Tempo control - Mid position.<br>Volume control - maximum. (fully clockwise)<br><br>Measure Switch - "2"<br>Variation Switch -"A" ("A" button will light when depressed).<br>Depress Waltz button<br>Sil/Sound to Sound balance control (on rear panel) - to center detent position. | | 1(a) R-127 Low freq. adj. (124-000380) | 1(a) A snare drum voice will be heard as the second beat in each measure. Adjust R-127 for minimum bass drum output signal. | |
| (b) Same as Step 1(a). | (b) Same as Step 1(a) | | (b) R-121 Hi freq. adj. (124-000380) | (b) Observe the white noise component of the snare drum and adjust R-121 to an output of 2.8 volts P/P. | |
| 2.LOW FREQ. ADJUST | | | | | |
| 2(a) Test point at Auto Vari Output Jack.<br><br>(Monitor by using external amplifier and speaker). | (a) Same as in step 1(a) | | (a) R-127 - Low freq. adjust. (124-000380) | (a) With Sil/Sound Switch still in sound position, re-adjust for a bass drum output of 1.6 volts P/P | |
| 3.VARIATIONS-VISUAL & LISTENING TEST<br><br>(Monitor by using external amplifier and speaker). | (a) Depress the four variation push buttons, one at a time<br><br>(b) Depress - Waltz button.<br>Variation Button-"A"<br>Sil/Sound to Sound<br><br>(c) Variation Button "B"<br>Sil/Sound to Sound<br>Auto Vari Slide Switch to "on"<br>Set Measure Switch to 1/2<br>Depress - Western Button | NOTE: As each button is depressed it will light and turn off the previously lit button.<br><br>NOTE: Simple Waltz pattern sounding. Depress variation buttons B, C and D in order, Waltz pattern will be more complicated as each button is depressed.<br><br>NOTE: Depress Sil/Sound to Sound. Rhythm will sound and variation "A" lamp will light at the same time. Observe that every two flashes of the tempo lamp, a different variation lamp will light in an A, B, C, D and repeat sequences. | | | |

| STEP TEST AND TEST POINT | DEPRESS TAB | PLAY KEY (S) | ADJUST | OSCILLOSCOPE OR INDICATION | FIG. |
|---|---|---|---|---|---|
| 4. VARIATION MEASURE RATE TABLE VISUAL & LISTENING TEST | | | | | |
| (Monitor by using external amplifier and speaker). | (a) As in Step 3(c) | | | | |
| | (b) Turn measures knob to: | | | | |
| | 1/2 ..... | NOTE: A variation change for every 2 flashes | | | |
| | 1 ..... | NOTE: A variation change for each measure, lamp changes. | | | |
| | 2 ..... | NOTE: A variation change for every other measure, lamp changes. | | | |
| | 4 ..... | NOTE: A variation change for every 4 measures, lamp changes. | | | |
| | 8 ..... | NOTE: A variation change for every 8 measures, lamp changes. | | | |
| | 16 ..... | NOTE: A variation change for every 16 measures, lamp changes. | | | |
| | (c) Move Auto Vari switch to the "off" position. | NOTE: The variations lamps will stop changing automatically. | | | |
| 5. FOOT SWITCH(IF INSTALLED) VISUAL & LISTENING TEST | | | | | |
| (Monitor by using external amplifier and speaker). | (a) Depress any Rhythm button, any variation button Sil/Sound to Sound Momentarily depress Foot Switch | NOTE: (a) That the Rhythm unit will be silenced. | | | |
| | (b) Release Foot Switch. | NOTE: (b) Rhythm Unit starts sounding with beat one of measure one. | | | |
| | (c) Depress foot switch when either variation "B" or "C" is lighted. | NOTE: (c) Release Foot Switch and note that the Rhythm Unit will start as in the previous step and that variation "A" shall light. | | | |
| 6. BALANCE CONTROL OPERATION VISUAL & LISTENING TEST | | | | | |
| (Monitor by using external amplifier and speaker). | (a) Depress any Rhythm button Sil/Sound to Sound Rotate balance control with screw driver from one extreme to the other. | NOTE: (a) That at one end all high frequency voices have disappeared and at the other end all low frequency voices have disappeared. | | | |
| | (b) Rotate balance control to the center detent position. | NOTE: (b) Proper balance of high and low frequencies. | | | |

# TION III
# S AND TEXT

hematic diagrams and text to illustrate and
oper Auto Vari servicing.

STRATIONS

ACCESSORY


| | Page |
|---|---|
| . . . . . | 3- 1 |
| . . . . . | 3- 2 |
| . . . . . | 3- 3 |
| . . . . . | 3- 4 |
| . . . . (124-000379) . . | 3- 5 |
| . . . . (124-000380) . . | 3- 6 |
| . . . . (124-000418) . . | 3- 7 |
| rly Model 124-000384) . . . . . | 3- 8 |

| STEP — TEST AND TEST POINT | DEPRESS TAB | PLAY KEY (S) | ADJUST | OSCILLOSCOPE OR INDICATION | FIG. |
|---|---|---|---|---|---|
| 4. VARIATION MEASURE RATE TABLE VISUAL & LISTENING TEST<br><br>(Monitor by using external amplifier and speaker). | (a) As in Step 3(c)<br><br>(b) Turn measures knob to:<br>1/2 .....<br>1 .....<br>2 .....<br>4 .....<br>8 .....<br>16 ..... | NOTE: A variation change for every 2 flashes<br>NOTE: A variation change for each measure, lamp changes.<br>NOTE: A variation change for every other measure, lamp changes.<br>NOTE: A variation change for every 4 measures, lamp changes.<br>NOTE: A variation change for every 8 measures, lamp changes.<br>NOTE: A variation change for every 16 measures, lamp changes. | | | |
| | (c) Move Auto Vari switch to the "off" position. | NOTE: The variations lamps will stop changing automatically. | | | |
| 5. FOOT SWITCH(IF INSTALLED) VISUAL & LISTENING TEST<br><br>(Monitor by using external amplifier and speaker). | (a) Depress any Rhythm button, any variation button Sil/Sound to Sound Momentarily depress Foot Switch | NOTE: (a) That the Rhythm unit will be silenced. | | | |
| | (b) Release Foot Switch. | NOTE: (b) Rhythm Unit starts sounding with beat one of measure one. | | | |
| | (c) Depress foot switch when either variation "B" or "C" is lighted. | NOTE: (c) Release Foot Switch and note that the Rhythm Unit will start as in the previous step and that variation "A" shall light. | | | |
| 6. BALANCE CONTROL OPERATION VISUAL & LISTENING TEST<br><br>(Monitor by using external amplifier and speaker). | (a) Depress any Rhythm button Sil/Sound to Sound Rotate balance control with screw driver from one extreme to the other. | NOTE: (a) That at one end all high frequency voices have disappeared and at the other end all low frequency voices have disappeared. | | | |
| | (b) Rotate balance control to the center detent position. | NOTE: (b) Proper balance of high and low frequencies. | | | |

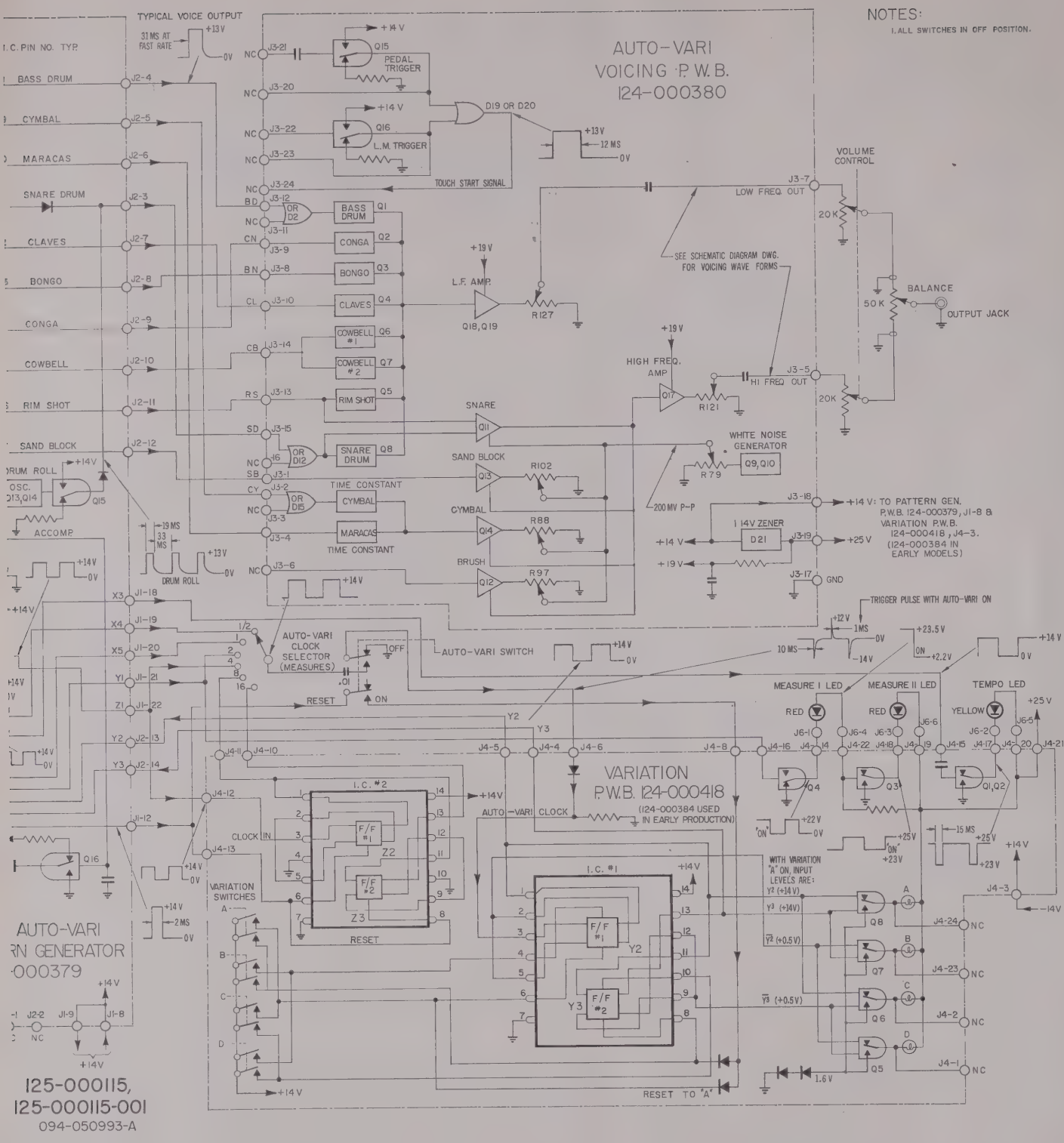
# SECTION III
# DIAGRAMS AND TEXT

**3-1 GENERAL** -- This section contains schematic diagrams and text to illustrate and provide information necessary to proper Auto Vari servicing.

## LIST OF ILLUSTRATIONS

### AUTO VARI-64-ACCESSORY


| Figure | | | Page |
|---|---|---|---|
| | General and List of Illustrations | | 3- 1 |
| 3- 1 | Logic Diagram Auto Vari-64 Accessory Model | | 3- 2 |
| 3- 2 | Theory of Operation Auto Vari -64 (Sheet 1 of 2) | | 3- 3 |
| 3- 3 | Theory of Operation Auto Vari -64 (Sheet 2 of 2) | | 3- 4 |
| 3- 4 | Pattern Generator Board-Schematic and Layout | (124-000379) | 3- 5 |
| 3- 5 | Voicing Board-Schematic and Layout | (124-000380) | 3- 6 |
| 3- 6 | Variation Board-Schmatic and Layout | (124-000418) (Early Model 124-000384) | 3- 7 |
| 3- 7 | Rhythm Tracks and Variation Chart | | 3- 8 |


NOTES:
1. ALL SWITCHES IN OFF POSITION.
AUTO-VARI VOICING P.W.B. 124-000380
TYPICAL VOICE OUTPUT
I.C. PIN NO. TYP.
BASS DRUM
CYMBAL
MARACAS
SNARE DRUM
CLAVES
BONGO
CONGA
COWBELL
RIM SHOT
SAND BLOCK
DRUM ROLL
ACCOMP.
PEDAL TRIGGER
L.M. TRIGGER
TOUCH START SIGNAL
BASS DRUM
CONGA
BONGO
CLAVES
COWBELL #1
COWBELL #2
RIM SHOT
SNARE DRUM
TIME CONSTANT
CYMBAL
MARACAS
L.F. AMP.
Q18, Q19
R127
SEE SCHEMATIC DIAGRAM DWG. FOR VOICING WAVE FORMS
VOLUME CONTROL
LOW FREQ. OUT
HIGH FREQ. AMP
HI FREQ OUT
BALANCE
OUTPUT JACK
WHITE NOISE GENERATOR
SNARE
SAND BLOCK
CYMBAL
BRUSH
200 MV P-P
14V ZENER
+14 V: TO PATTERN GEN. P.W.B. 124-000379, J1-8 & VARIATION P.W.B. 124-000418, J4-3. (124-000384 IN EARLY MODELS)
GND
TRIGGER PULSE WITH AUTO-VARI ON
AUTO-VARI CLOCK SELECTOR (MEASURES)
AUTO-VARI SWITCH
RESET
MEASURE I LED
MEASURE II LED
TEMPO LED
VARIATION P.W.B. 124-000418
(124-000384 USED IN EARLY PRODUCTION)
AUTO-VARI CLOCK
I.C. #1
I.C. #2
F/F #1
F/F #2
CLOCK IN
VARIATION SWITCHES
WITH VARIATION "A" ON, INPUT LEVELS ARE:
RESET TO "A"
AUTO-VARI RN GENERATOR -000379
125-000115,
125-000115-001
094-050993-A

1) GENERAL.--This section contains the theory
the Auto Vari Rhythm Units. There are basi
The Accessory Model, which is a self conta
its own power source, but does require an e
and speaker. This unit does not contain th
iment feature or the play along voices. Re
features should be excluded when using this
Accessory Model.

The In-Built Version, which is assembled in
the complete organ. The Rhythm Units and f
identical in the organ models it is used.
el and mountings will differ due to cabinet
or. The In-Built does contain the Auto-Acc
play along voices.

The Auto Vari has sixteen Rhythm patterns,
16 interlocking push buttons which can be d
ularly or in combinations. Two of the butt
time Rhythm patterns, and other fourteen bu
4/4 time Rhythm patterns.

2) PATTERN GENERATOR BOARD - 124-000379--The
contains the 075-000430 custom Rhythm IC wh
ally the heart of the Auto Vari 64. This
mable pattern memory, sixteen D.C. controll
puts, twelve outputs for eleven voices and
paniment signal. There is a separate gate
disable the eleven voice outputs. This gat
this Rhythm unit. There is a clock input w
drive the internal decoding circuits. The
quency varies from 4.8 HZ to 30 HZ and driv
address decoder. The five counter stages w
address decoder are designated X1 through X
X4 and X5 outputs brought out of the I.C.
divider Y1 which in turn drives the measure
Y1 feeds Divider Z1 which provides one of s
outputs for driving the variation decoder.
the two 3/4 time patterns is activated, the
automatically changes the address decoder f
measure to an 18 count measure. There are
control inputs which are fed by dividers Y2
variation board (123-000418). The "430" Rh
these inputs into one of four possible vari
tempo of the Rhythm Unit is controlled by a
tiometer located on the front panel of the
tempo control is connected to J1-13 and co
of charging current for capacitor C1. The
C1 will increase until it is greater than t
junction of R5 and R6. Transistor Q1, and
junction transistor, will then turn on and
resistor R4. This discharge current will t
tor Q17, which is used to amplify the outpu
+14 volt signal required to drive the clock
Rhythm I.C.

Transistors Q2 and Q3 from a "Set-Reset" F
and starts the Rhythm Generator. The input

either 3/4 time rhythm button is depressed, the
Q11 will be disconnected and Q11 will be connected
vider output. The Y1 divider output will cause
note to sound at the beginning of measure 1
bass note to sound at the beginning of measure
bass, low bass, and accompaniment organ sig-
ted to ground through diodes D13, D4, D5 and
Auto-Accompaniment switch is "off".

Q13 and Q14 form an astable multi-vibrator with
of approximately 20 HZ. This astable is turned
he Rhythm I.C. supplies a +14 volt drum roll
I.C. pin #38. The output of the astable is amp-
nsistor Q15 which supplies a low impedance
signal to the snare drum output through diode D9.

outputs (J2-3 through J2-12) are connected
he I.C. voice output pins. These outputs pro-
dance (2,000-ohm) positive-going drive pulses
ed directly to the voicing circuits on the
icing board.

RD - 124-000418--The Variation Board provides
circuits:
caded dividers which provide the "8" and "16"
signals for the Autovari measures switch.
station lighted pushbutton switch assembly
sociated I.C. divider, decoding circuits and
on switch lamp amplifiers.
tor lamp amplifier for Tempo, Measure I and
II.

D" divider package (I.C. 2) is used to provide
16" measure signals for the automatic varia-
he first divider input, Z1-Pin 12, is connected
he Z1 output of the Pattern Generator Board.
ider output (Z2) is one half the frequency of
Z3 is one fourth the frequency of the input.
re +14 volts square waves which are wired dir-
"8" and "16" positions of the measures switch.
ut (Pin 13) receives a +14 volt reset pulse
rhythm unit starts sounding.

the measures switch is connected through a .01
r to the Autovari switch. When the Autovari
", this signal is connected through the varia-
put (Pin 6) to R16, D1, R17 and pin 3 of I.C. 1.
nts are used to differentiate the various clock
and drive the two cascaded dividers (I.C. 1).
utputs, which are designated $y^2$ (first stage) and
age), are used to drive the variation decoding
e the 075-000430 rhythm I.C. and the "2 input and"
h drive the four variation lamps. The "and"
ariation A is comprised of D10, D11, R29 and Q8.
d D13 are used to bias the emitters of Q5-Q8
ely +1.6 volts. This bias is needed because
high "0" level at the output of the I.C.
3 are both at a "1" level, D10 and D11 will
ased and R29 will supply base current to Q8 which

FIGURE 3-2
THEORY OF OPERATION
FOR AUTO VARI - 64
(SHEET 1 OF 2)

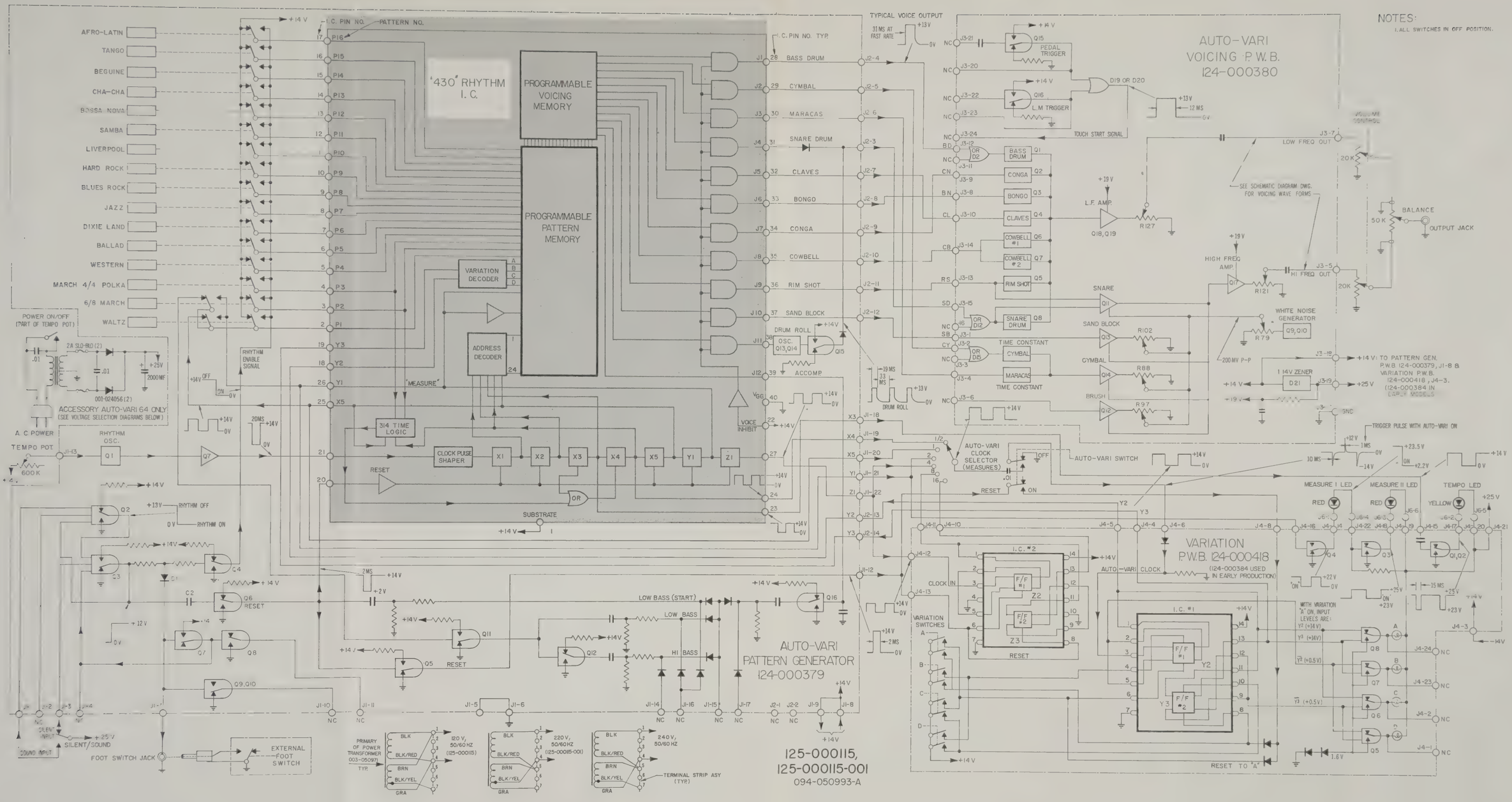



FIGURE 3-1
ACCESSORY MODEL
LOGIC DIAGRAM
AUTO VARI - 64

# AUTO VARI-64 THEORY OF OPERATION (SHEET 1 OF 2)

1) **GENERAL.**--This section contains the theory of operation, of the Auto Vari Rhythm Units. There are basically two models. The Accessory Model, which is a self contained unit with its own power source, but does require an external amplifier and speaker. This unit does not contain the Auto-Accompaniment feature or the play along voices. Reference to these features should be excluded when using this text for the Accessory Model.

The In-Built Version, which is assembled into and part of the complete organ. The Rhythm Units and functions are identical in the organ models it is used. The control panel and mountings will differ due to cabinet styling and color. The In-Built does contain the Auto-Accompaniment and play along voices.

The Auto Vari has sixteen Rhythm patterns, controlled by 16 interlocking push buttons which can be depressed singularly or in combinations. Two of the buttons select 3/4 time Rhythm patterns, and other fourteen buttons select 4/4 time Rhythm patterns.

2) **PATTERN GENERATOR BOARD - 124-000379**--The 124-000379 Board contains the 075-000430 custom Rhythm IC which is basically the heart of the Auto Vari 64. This IC has a programmable pattern memory, sixteen D.C. controlled pattern inputs, twelve outputs for eleven voices and one Auto-Accompaniment signal. There is a separate gate input which will disable the eleven voice outputs. This gate is not used in this Rhythm unit. There is a clock input which is used to drive the internal decoding circuits. The clock input frequency varies from 4.8 HZ to 30 HZ and drives the 24/18 count address decoder. The five counter stages which make up the address decoder are designated X1 through X5, with only X3, X4 and X5 outputs brought out of the I.C. Divider X5 drives divider Y1 which in turn drives the measure decoder. Divider Y1 feeds Divider Z1 which provides one of switch selectable outputs for driving the variation decoder. When either of the two 3/4 time patterns is activated, the decoding logic automatically changes the address decoder from a 24 count measure to an 18 count measure. There are two variation control inputs which are fed by dividers Y2 and Y3 on the variation board (123-000418). The "430" Rhythm I.C. decodes these inputs into one of four possible variations. The tempo of the Rhythm Unit is controlled by a 500 K potentiometer located on the front panel of the Rhythm Unit. The tempo control is connected to J1-13 and controls the amount of charging current for capacitor C1. The voltage across C1 will increase until it is greater than the voltage at the junction of R5 and R6. Transistor Q1, and programmable unijunction transistor, will then turn on and discharge C1 through resistor R4. This discharge current will turn on transistor Q17, which is used to amplify the output of Q1 for the +14 volt signal required to drive the clock input of the "430" Rhythm I.C.

Transistors Q2 and Q3 from a "Set-Reset" Flip-Flop which stops and starts the Rhythm Generator. The inputs at J1-1 and 2 are "start" inputs and J1-3 is a "stop" input. With either the Silent/Sound rocker or an input from the lower manual or pedal during "Touch-Start Mode", transistor Q2 will turn on and Q3 will turn off. With Q3 off, a +12 volt signal is applied through R17 and R18 to turn of transistor Q4. This "on" signal can be interrupted by the Foot Switch through J1-7 and diode D1 without changing the state of Q2 or Q3. When Q4 turns on, a "Ground" signal is applied to a common bus connecting all normally open rhythm pattern switches together. Therefore, with a rhythm switch depressed, a "ground" signal will be applied to one of the I.C. pattern inputs and "enable" the rhythm generator. Transistor Q3 also couples a positive signal through C2, R21 and Q6. Transistor Q6 turns "on" and provides a reset pulse to pin 20 of the rhythm I.C. This reset pulse is inverted by transistor Q5 and used to reset the Y2-Y3 dividers and the variation dividers Z2-Z3 on the variation dividers board (124-000418). The reset pulse from Q6 is also coupled through C3, R38 and D6 and (during Auto-Accompaniment Mode only) for the first low bass note each time the rhythm was started.

Transistors Q7 through Q10 provide the "ground" signals for the automatic switching of the organ from Auto-Accompaniment mode to "organ" mode when the Auto-Accompaniment switch is on.

Transistor Q9 is normally supplied a +14 volt signal through R25, R26 and R30. Transistor Q9 provides the low impedance necessary to turn on Q10 through the current limiting resistor R31. Transistor Q10 will "ground" all negative signals applied to J1-10 from the organ. When the Foot Switch (located on the organ swell pedal) is activated, a ground is applied to J1-7 and connected to the junction of R26, R30 and Diode D1. This "ground" removes the +14 volt signal normally applied to Q9, thereby turning off transistor Q9 and Q10. Transistor Q7 will now turn on and supply current through R28 to Q8. Transistor Q8 will now "ground" all negative signals applied to J1-11. Transistors Q8 and Q10 can "sink" up to 8ma. from a negative voltage source.

Transistor Q16 is a pulse inverter for the automatic accompaniment signals. Capacitor C11 and resistor R69 form the differentiation network for the negative accompaniment output pulses. Diode D13 shunts the negative accompaniment signal to ground through J1-15 and the Auto-Accompaniment switch when Auto-Accompaniment is off.

The high and low bass output signals are formed by transistors Q12 and Q11 respectively. The input to transistor Q11 is the X5 square wave output from the "430" I.C. This output is routed through the normally closed contacts of the Waltz and 6/8 March rhythm pattern switches to the base of Q11. The output of Q11 is differentiated by C4 and R36, with the negative pulse passing through D3 (with Auto-Accompaniment on) to the low bass output. The frequency of X5 is one cycle per measure, thereby causing Q11 to generate a negative pulse at the beginning of each measure. Transistor Q12 inverts the output of Q11 and generates a negative pulse (through C5, R41, R42 and D10) during the middle of each measure. If either 3/4 time rhythm button is depressed, the X5 input to Q11 will be disconnected and Q11 will be connected to the Y1 divider output. The Y1 divider output will cause the low bass note to sound at the beginning of measure 1 and the high bass note to sound at the beginning of measure 2. The high bass, low bass, and accompaniment organ signals are shunted to ground through diodes D13, D4, D5 and D11 when the Auto-Accompaniment switch is "off".

Transistors Q13 and Q14 form an astable multi-vibrator with a frequency of approximately 20 HZ. This astable is turned on whenever the Rhythm I.C. supplies a +14 volt drum roll signal from I.C. pin #38. The output of the astable is amplified by transistor Q15 which supplies a low impedance (2,200-ohm) signal to the snare drum output through diode D9.

The ten voice outputs (J2-3 through J2-12) are connected directly to the I.C. voice output pins. These outputs provide low impedance (2,000-ohm) positive-going drive pulses which are wired directly to the voicing circuits on the 124-000380 voicing board.

3) **VARIATION BOARD - 124-000418**--The Variation Board provides the following circuits:
   - A) Two cascaded dividers which provide the "8" and "16" measure signals for the Autovari measures switch.
   - B) A four-station lighted pushbutton switch assembly with associated I.C. divider, decoding circuits and variation switch lamp amplifiers.
   - C) Transistor lamp amplifier for Tempo, Measure I and Measure II.

A CMOS "Dual D" divider package (I.C. 2) is used to provide the "8" and "16" measure signals for the automatic variation mode. The first divider input, Z1-Pin 12, is connected directly to the Z1 output of the Pattern Generator Board. The first divider output (Z2) is one half the frequency of the input and Z3 is one fourth the frequency of the input. The outputs are +14 volts square waves which are wired directly to the "8" and "16" positions of the measures switch. The reset input (Pin 13) receives a +14 volt reset pulse each time the rhythm unit starts sounding.

The output of the measures switch is connected through a .01 mfd. capacitor to the Autovari switch. When the Autovari switch is "on", this signal is connected through the variation clock input (Pin 6) to R16, D1, R17 and pin 3 of I.C. 1. These components are used to differentiate the various clock input signals and drive the two cascaded dividers (I.C. 1). The divider outputs, which are designated $y^2$ (first stage) and $y^3$ (second stage), are used to drive the variation decoding circuit inside the 075-000430 rhythm I.C. and the "2 input and" circuits which drive the four variation lamps. The "and" circuit for variation A is comprised of D10, D11, R29 and Q8. Diodes D12 and D13 are used to bias the emitters of Q5-Q8 at approximately +1.6 volts. This bias is needed because of a possible high "0" level at the output of the I.C. When Y2 and Y3 are both at a "1" level, D10 and D11 will be reverse biased and R29 will supply base current to Q8 which

FIGURE 3-2
THEORY OF OPERATION
FOR AUTO VARI - 64
(SHEET 1 OF 2)

# OF OPERATION (SHEET 2 OF 2)

s are used to generate all low fre-
voices. These oscillators are
ying pulse which provides bias to
. An R-C time constant at the input
determines the length of time the

oscillator circuit is the Bass Drum
t keying pulse is applied to Pin
y C1 and R3. Diode D1 allows
charge capacitor C2. Capacitor
form the oscillator time constant
ed only on Bass Drum and Conga
e a part of the input pulse dir-
hich causes transistor Q1 to be
a short time. This condition
rike" tone when the bass drum
1 and R8 provide a small amount of
n order to give the voice envel-
tors C4, C5 and C6 and resistors
equency of the oscillator. Resis-
he collector current when the oscil-
tor R10 controls the amount of bass
low frequency preamplifier.
equency oscillators have capaci-
tput level resistor (such as C12
apacitor is used to remove some
rom the voice output.

ed by transistor Q9 by reverse bias-
ion into a zener region. The
d by R77. The white noise output
45 to the base of a common emitter
e noise output is controlled by
adjusted for a nominal peak-to-peak
The output of the white noise
to four white noise gates through
olation networks.

for the Snare Drum is also used
positive Snare Drum input applied
gh C58 and D11 to charge up cap-
es through R73 and the base of
turned "on", white noise coupled to
C48 is amplified by Q11. Cap-
e white noise frequency spectrum
the output level. The Rim Shot
through C25, D9, and R72 to the

(Q12) is similar to the Snare
t the output frequency spectrum
onant tank circuit (L2 and C61).
ush circuit is controlled by

trolled voice and does not have
he other white noise voices do.

The input pulses are coupled directly to Q13 through R99, R101, and D14. The output frequency spectrum is shaped by C51 and C52. The output level is set by potentiometer R102.

The Cymbal and Maracas voices share the same white noise gate, but each voice has its own separate time constant circuit.

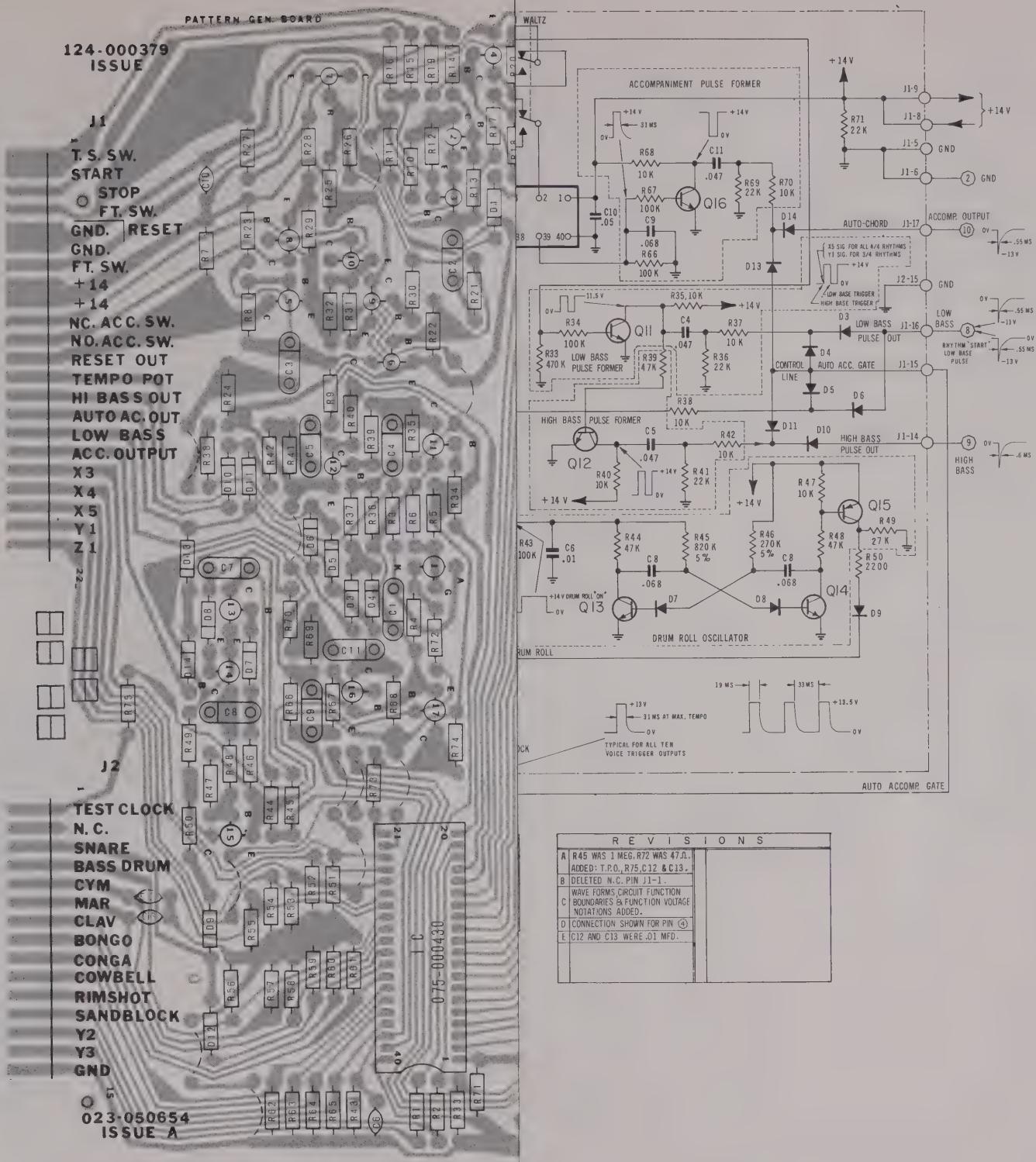
The Cymbal has a dual slope time constant with the initial attack controlled by C65 and R108, while the rest of the time constant is controlled by C54 and R104. Both Cymbal and Maracas time constants are connected directly to the base of Q14, the white noise gate. The output of Q14 is shaped by LI and C55, and 8 K HZ tank circuit. The output level of the Cymbal/Maracas white noise gate is controlled by R88.

Transistors Q18 and Q19 are used for the low frequency preamplifier, which amplifies the outputs of all phase shift oscillator voicing circuits. Potentiometer R127 is used to adjust the gain of the low frequency output channel.

Transistor Q17 is the high frequency (white noise) preamplifier. The output level of the preamp is controlled by potentiometer R121.

Transistors Q15 and Q16 form the two pulse inverters needed to convert -27 volt organ signals to +14 volt pulses for keying the "Play-Along" voices. Pedal signals are applied to Pin 21 and converted to +14 volt signals by Q15. The output of Q15 passes through R114 to two operator selectable switches; Bass Drum on Pedals and Cymbal on Pedals. The outputs of these switches connect to Pins 11 and 3 respectively on the Voicing Board. Transistor Q16 operates in an identical manner for lower manual signals. Diodes D19 and D20 couple lower manual and pedal trigger pulses to the Touch Start circuit on the Pattern Generator Board - 124-000379.

The +14 volts used to operate all Autovari circuits is supplied by R131 and a $\pm$5%, 14-volt zener diode D21. Capacitor C76 is used to slow down the initial "turn-on" of the supply voltage and help in absorbing power supply spikes generated by various Autovari circuits. Resistor R129 and capacitor C75 are used to decouple the preamp power supply from the main +25 volt power supply input.




| REVISIONS | | |
|---|---|---|
| A | R45 WAS 1 MEG, R72 WAS 47Ω. ADDED: T.P.O., R75, C12 & C13. | |
| B | DELETED N.C. PIN J1-1. | |
| C | WAVE FORMS, CIRCUIT FUNCTION BOUNDARIES & FUNCTION VOLTAGE NOTATIONS ADDED. | |
| D | CONNECTION SHOWN FOR PIN ④ | |
| E | C12 AND C13 WERE .01 MFD. | |

FIGURE 3-4
PATTERN GENERATOR
BOARD-SCHEMATIC & LAYOUT
(124-000379

# AUTO VARI-64 THEORY OF OPERATION (SHEET 2 OF 2)

will then turn on and light variation lamp A.

The reset input (pin 8) receives a +14 volt reset pulse when the Autovari switch is ON and the rhythm unit is switched from SILENT to SOUND. This reset pulse sets both Y2 and Y3 dividers to the "1" state through diodes D2 and D3. This "1" state programs the "430" I.C. for variation "A". The variation clock will then cause the variation to change in a A-B-C-D-A sequence.

The tempo lamp is driven by an amplifier comprised of transistors Q1 and Q2. The input clock is provided by the $X^3$ divider in the rhythm I.C. This clock is differentiated by C1 and R7 and provides an "ON" time of approximately 15 milliseconds.

The $Y^1$ divider output from the rhythm I.C. is used to drive transistor Q4, the measure I lamp amplifier. An output from the measure I circuit, located at the junction of R13, Pin 22 and the anode of the measure I L.E.D., is used to drive transistor Q3, the measure II lamp amplifier. When measure I lamp is "ON", transistor Q3 and the measure II lamp will be OFF. When measure I lamp is OFF, transistor Q3 will receive input drive current from R12 and turn "ON", lighting the measure II lamp.

4) VOICING BOARD - 124-000380--The Autovari voicing board contains eleven voices, ten of which are used for the automatic rhythm and one (brush) is only for external keying (lower manual). There are also three prime inputs such as Bass Drum (Pin 11), Snare Drum (Pin 16), and Cymbal (Pin 3), which also are only used for external keying purposes.

There are six basic circuits on this PWB which are listed:

A) Phase Shift Oscillator - There are eight phase shift oscillators which are used for the following voices: Bass Drum (1), Conga (1), Bongo (1), Claves (1), Rim Shot (1), Cowbell (2), and Snare Drum (1).
B) White Noise Generator - There is a white noise generator which supplies all the white noise gates with a broad band white noise signal.
C) White Noise Gate - There are four white noise gates which are used for the following voices: Snare Drum Rim Shot (1), Brush (1), Sand Block (1), Cymbal and Maracas (1).
D) Preamplifiers - There are two preamplifiers used to collect and amplify rhythm output signals. One preamp is used for all low frequency voices (phase shift oscillators) while the other is used for all white noise voices.
E) Pulse Inverters - There are two pulse inverter circuits which convert negative organ pulses to positive pulses for voice triggers. One circuit is used for pedal pulses while the other is used for lower manual pulses.
F) Power Supply - There is a +14 volt power supply which supplies all three rhythm boards with a stable supply voltage.

The phase shift oscillators are used to generate all low frequency (60 HZ to 2,500 HZ) voices. These oscillators are turned on by a positive keying pulse which provides bias to the oscillator transistors. An R-C time constant at the input of each oscillator circuit determines the length of time the oscillator is on.

An example of phase shift oscillator circuit is the Bass Drum voicing circuit. The input keying pulse is applied to Pin 12 and is differentiated by C1 and R3. Diode D1 allows only the positive pulse to charge capacitor C2. Capacitor C2 and resistors R6 and R8 form the oscillator time constant circuit. Capacitor C3 (used only on Bass Drum and Conga circuits) is used to couple a part of the input pulse directly to the base of Q1, which causes transistor Q1 to be driven into saturation for a short time. This condition creates the "thump" or "strike" tone when the bass drum first sounds. Resistors R1 and R8 provide a small amount of forward bias (.42 volts) in order to give the voice envelope a long "tail". Capacitors C4, C5 and C6 and resistors R4 and R5 determine the frequency of the oscillator. Resistors R2 and R9 determine the collector current when the oscillator is turned on. Resistor R10 controls the amount of bass drum signal applied to the low frequency preamplifier. Note that all other low frequency oscillators have capacitors in series with the output level resistor (such as C12 for Conga). This series capacitor is used to remove some low frequency components from the voice output.

The white noise is generated by transistor Q9 by reverse biasing the emitter-base junction into a zener region. The zener current is controlled by R77. The white noise output passes through capacitor C45 to the base of a common emitter amplifier (Q10). The white noise output is controlled by potentiometer R79, and is adjusted for a nominal peak-to-peak reading of 200 millivolts. The output of the white noise potentiometer is connected to four white noise gates through four capacitor/resistor isolation networks.

The white noise gate (Q11) for the Snare Drum is also used for the Rim Shop voice. A positive Snare Drum input applied to Pin 15 is coupled through C58 and D11 to charge up capacitor C44, which discharges through R73 and the base of transistor Q11. With Q11 turned "on", white noise coupled to the base of Q11 by R81 and C48 is amplified by Q11. Capacitor C46 and C47 shape the white noise frequency spectrum and resistor R76 controls the output level. The Rim Shot input (Pin 13) is coupled through C25, D9, and R72 to the white noise gate.

The Brush white noise gate (Q12) is similar to the Snare Drum noise gate except that the output frequency spectrum is shaped by a 12 K HZ resonant tank circuit (L2 and C61). The output level of the Brush circuit is controlled by potentiometer R97.

The Sand Block is a DC-controlled voice and does not have a percussive envelope as the other white noise voices do.

The input pulses are coupled directly to Q13 through R99, R101, and D14. The output frequency spectrum is shaped by C51 and C52. The output level is set by potentiometer R102.

The Cymbal and Maracas voices share the same white noise gate, but each voice has its own separate time constant circuit.

The Cymbal has a dual slope time constant with the initial attack controlled by C65 and R108, while the rest of the time constant is controlled by C54 and R104. Both Cymbal and Maracas time constants are connected directly to the base of Q14, the white noise gate. The output of Q14 is shaped by L1 and C55, and 8 K HZ tank circuit. The output level of the Cymbal/Maracas white noise gate is controlled by R88.

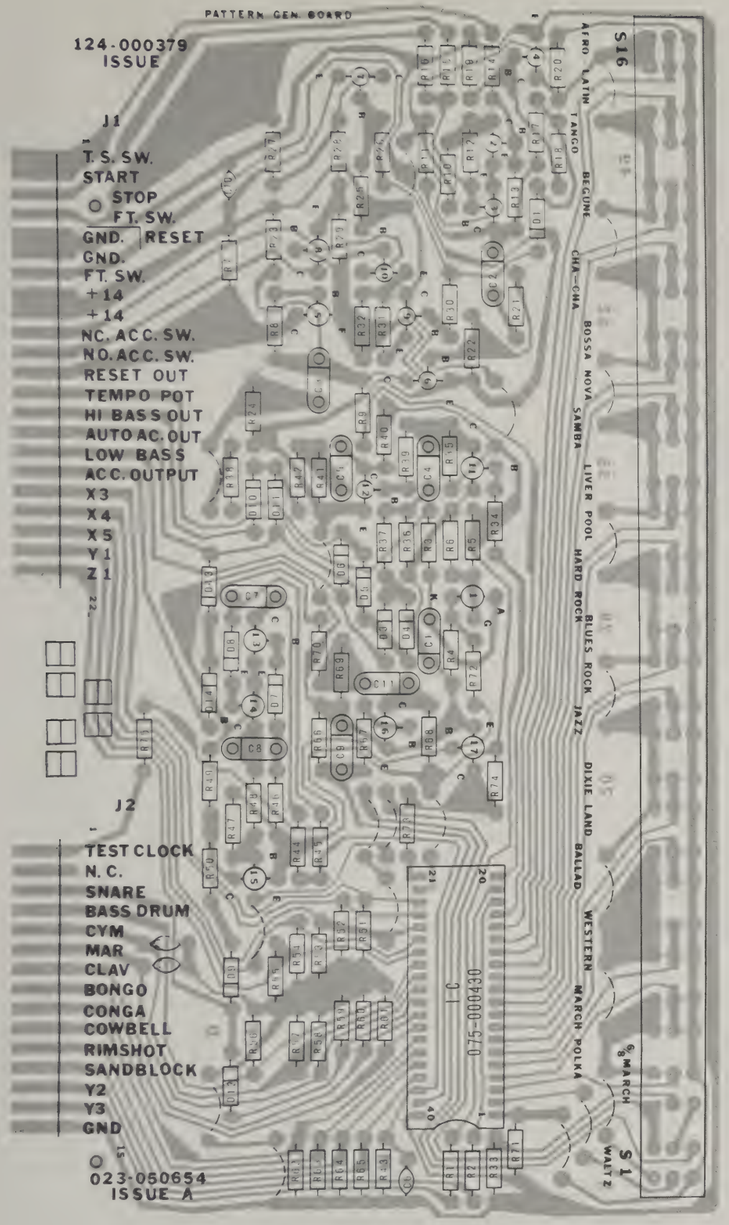
Transistors Q18 and Q19 are used for the low frequency preamplifier, which amplifies the outputs of all phase shift oscillator voicing circuits. Potentiometer R127 is used to adjust the gain of the low frequency output channel.

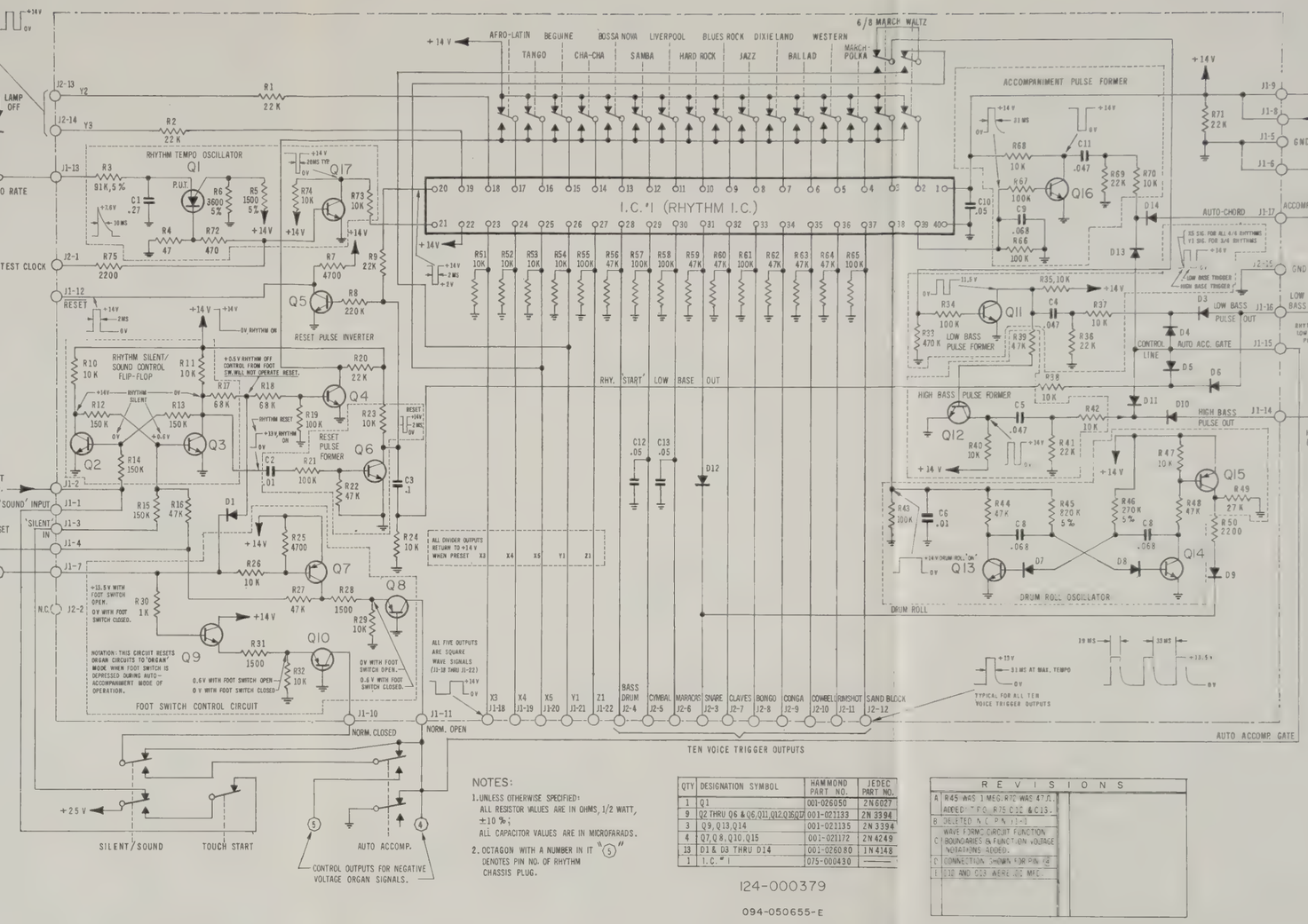
Transistor Q17 is the high frequency (white noise) preamplifier. The output level of the preamp is controlled by potentiometer R121.

Transistors Q15 and Q16 form the two pulse inverters needed to convert -27 volt organ signals to +14 volt pulses for keying the "Play-Along" voices. Pedal signals are applied to Pin 21 and converted to +14 volt signals by Q15. The output of Q15 passes through R114 to two operator selectable switches; Bass Drum on Pedals and Cymbal on Pedals. The outputs of these switches connect to Pins 11 and 3 respectively on the Voicing Board. Transistor Q16 operates in an identical manner for lower manual signals. Diodes D19 and D20 couple lower manual and pedal trigger pulses to the Touch Start circuit on the Pattern Generator Board - 124-000379.

The +14 volts used to operate all Autovari circuits is supplied by R131 and a ±5%, 14-volt zener diode D21. Capacitor C76 is used to slow down the initial "turn-on" of the supply voltage and help in absorbing power supply spikes generated by various Autovari circuits. Resistor R129 and capacitor C75 are used to decouple the preamp power supply from the main +25 volt power supply input.

FIGURE 3-3
THEORY OF OPERATION
FOR AUTO VARI - 64
(SHEET 2 OF 2)




NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10 %;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. OCTAGON WITH A NUMBER IN IT (5) DENOTES PIN NO. OF RHYTHM CHASSIS PLUG.

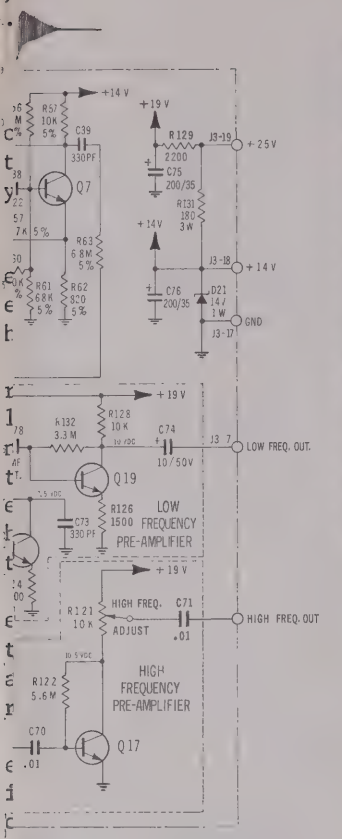
| QTY | DESIGNATION SYMBOL | HAMMOND PART NO. | JEDEC PART NO. |
|---|---|---|---|
| 1 | Q1 | 001-026050 | 2N6027 |
| 9 | Q2 THRU Q6 & Q8, Q11, Q12, Q16 | 001-021133 | 2N3394 |
| 3 | Q9, Q13, Q14 | 001-021135 | 2N3394 |
| 4 | Q7, Q8, Q10, Q15 | 001-021172 | 2N4249 |
| 13 | D1 & D3 THRU D14 | 001-026080 | 1N4148 |
| 1 | I.C. #1 | 075-000430 | ——— |

124-000379

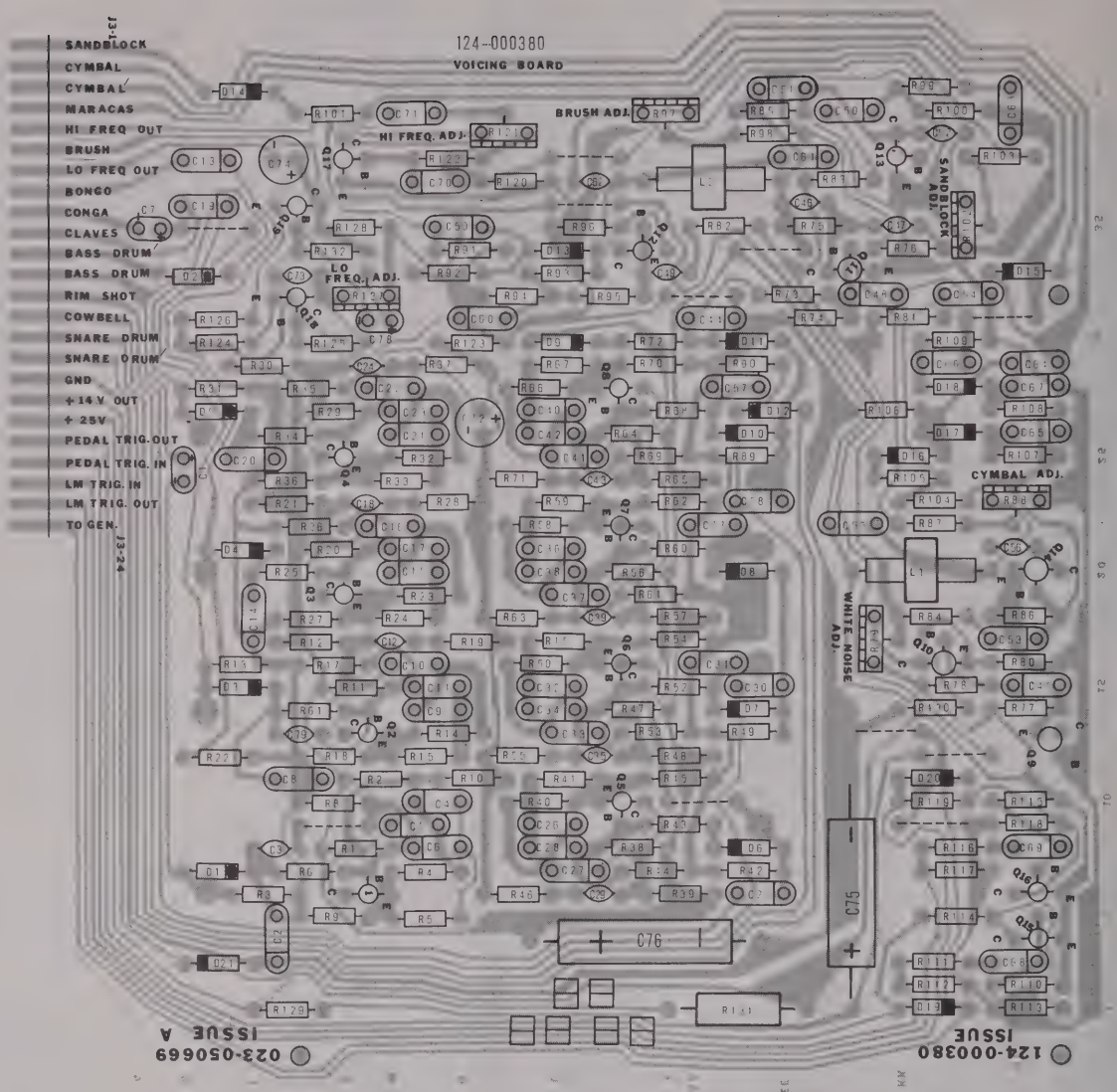
094-050655-E

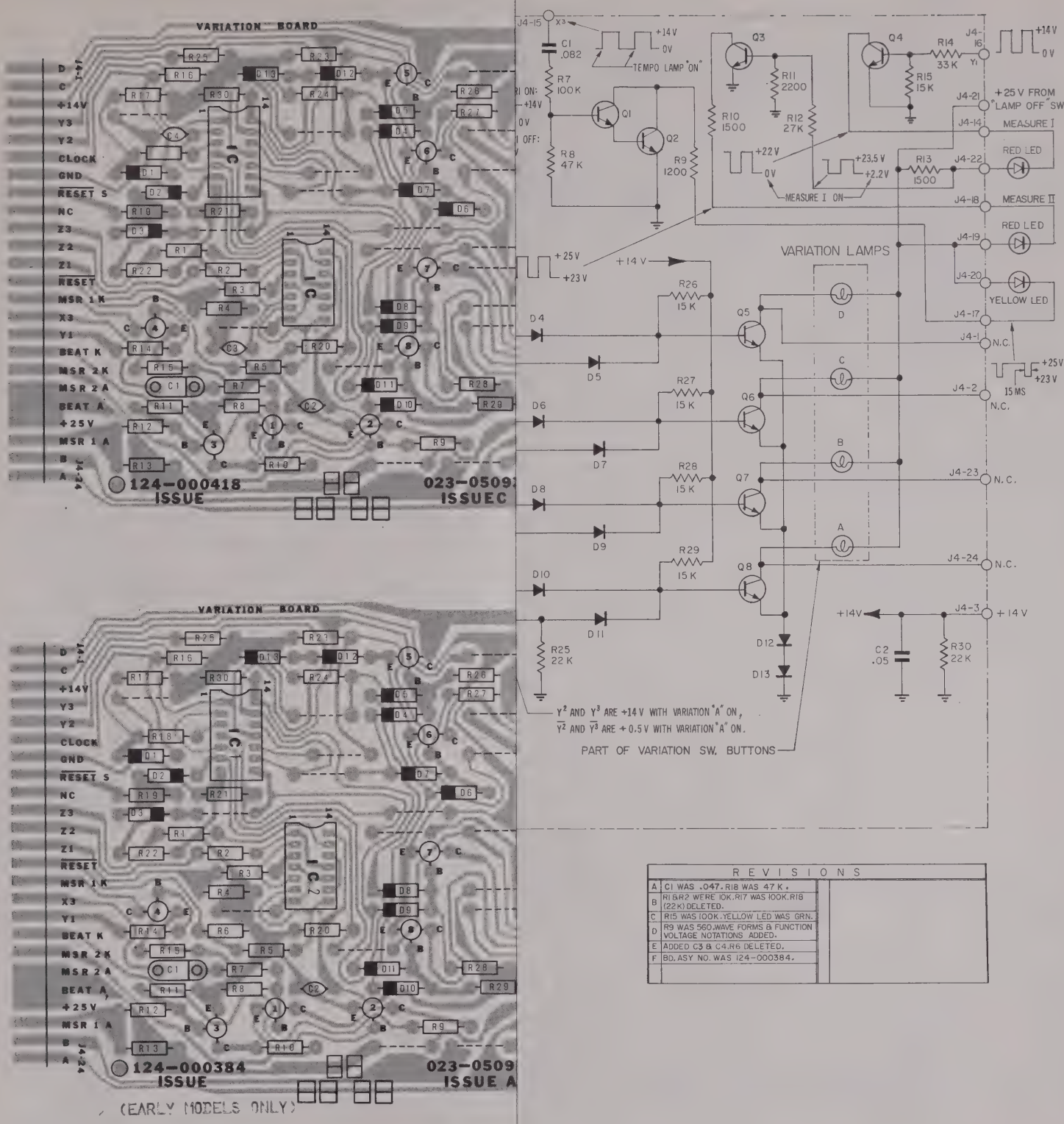
| REVISIONS | |
|---|---|
| A | R45 WAS 1 MEG; R72 WAS 47 Ω. ADDED C12, C13, R75 C12 & C13. |
| B | DELETED N.C. PIN 13-3 |
| C | WAVE FORM CIRCUIT FUNCTION BOUNDARIES & FUNCTION VOLTAGE NOTATIONS ADDED. |
| D | CONNECTION SHOWN FOR PIN 4 |
| E | D12 AND C13 WERE DO NOT MFG. |

FIGURE 3-4
PATTERN GENERATOR
BOARD-SCHEMATIC & LAYOUT
(124-000379



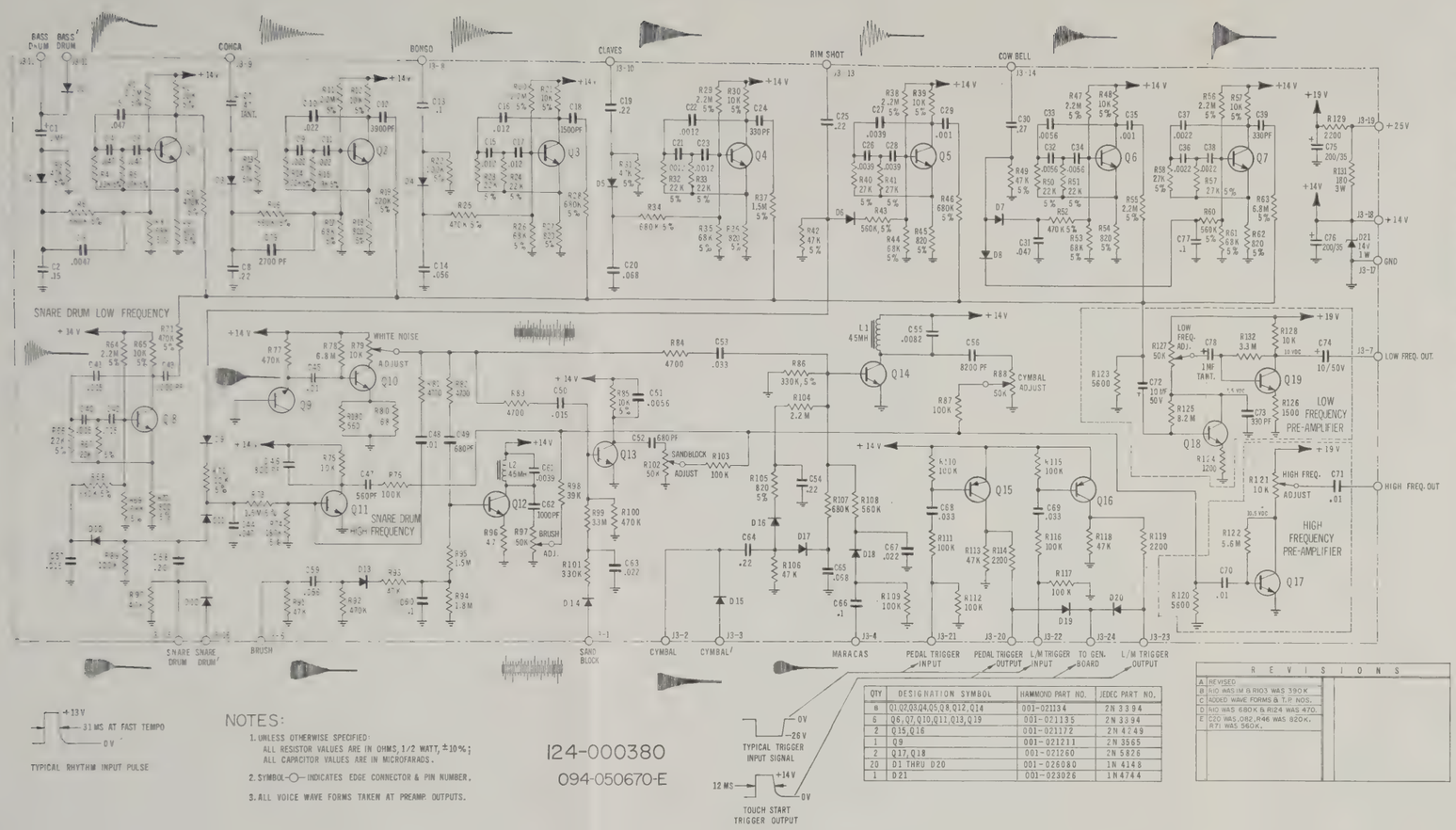

| R E V I S I O N S | |
|---|---|
| REVISED:<br>R10 WAS 1M & R103 WAS 390 K<br>ADDED WAVE FORMS & T.P. NOS.<br>R10 WAS 680K & R124 WAS 470.<br>C20 WAS .082, R46 WAS 820K.<br>R71 WAS 560K. | |

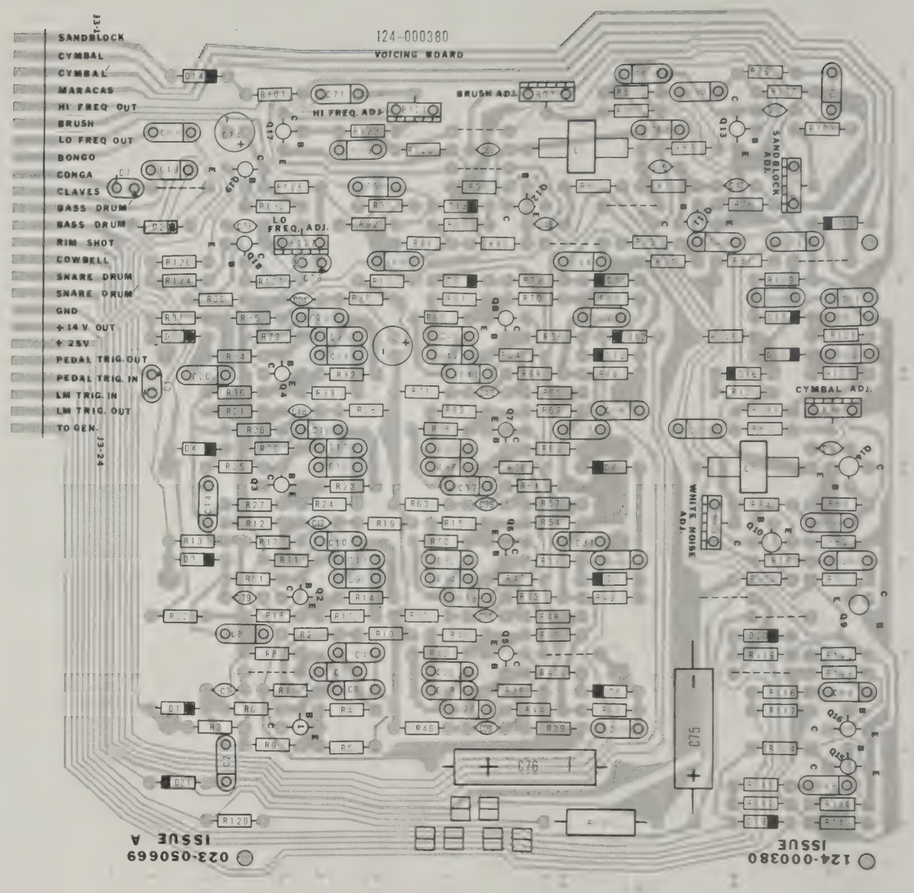





| REVISIONS | | |
|---|---|---|
| A | C1 WAS .047. R18 WAS 47 K. | |
| B | R1 & R2 WERE 10K. R17 WAS 100K. R18 (22K) DELETED. | |
| C | R15 WAS 100K. YELLOW LED WAS GRN. | |
| D | R9 WAS 560. WAVE FORMS & FUNCTION VOLTAGE NOTATIONS ADDED. | |
| E | ADDED C3 & C4. R6 DELETED. | |
| F | BD. ASY NO. WAS 124-000384. | |

FIGURE 3-6
VARIATION BOARD SCHEMATIC
AND LAYOUT
(124-000418)
(124-000384 EARLY MODELS)




+13V
31 MS AT FAST TEMPO
0V
TYPICAL RHYTHM INPUT PULSE

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. SYMBOL —○— INDICATES EDGE CONNECTOR & PIN NUMBER.
3. ALL VOICE WAVE FORMS TAKEN AT PREAMP OUTPUTS.

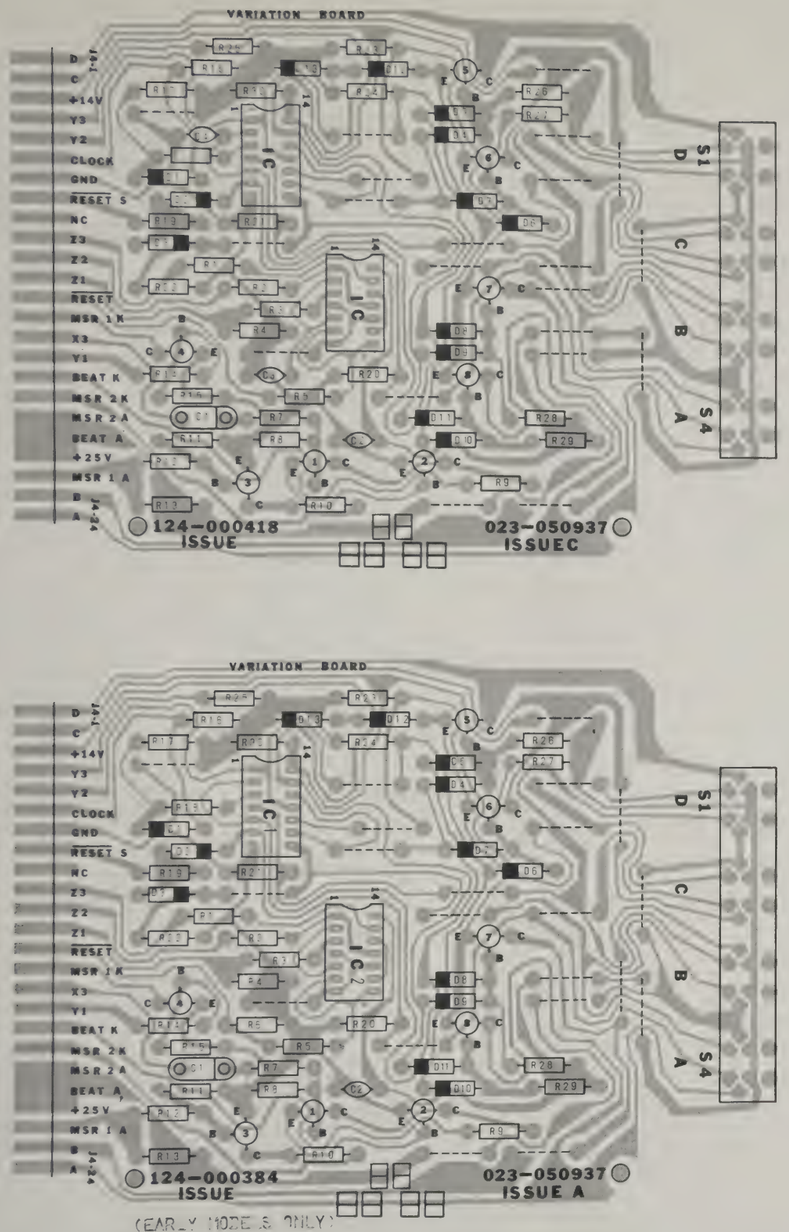
124-000380
094-050670-E

0V
26 V
TYPICAL TRIGGER INPUT SIGNAL
12 MS
+14V
0V
TOUCH START TRIGGER OUTPUT

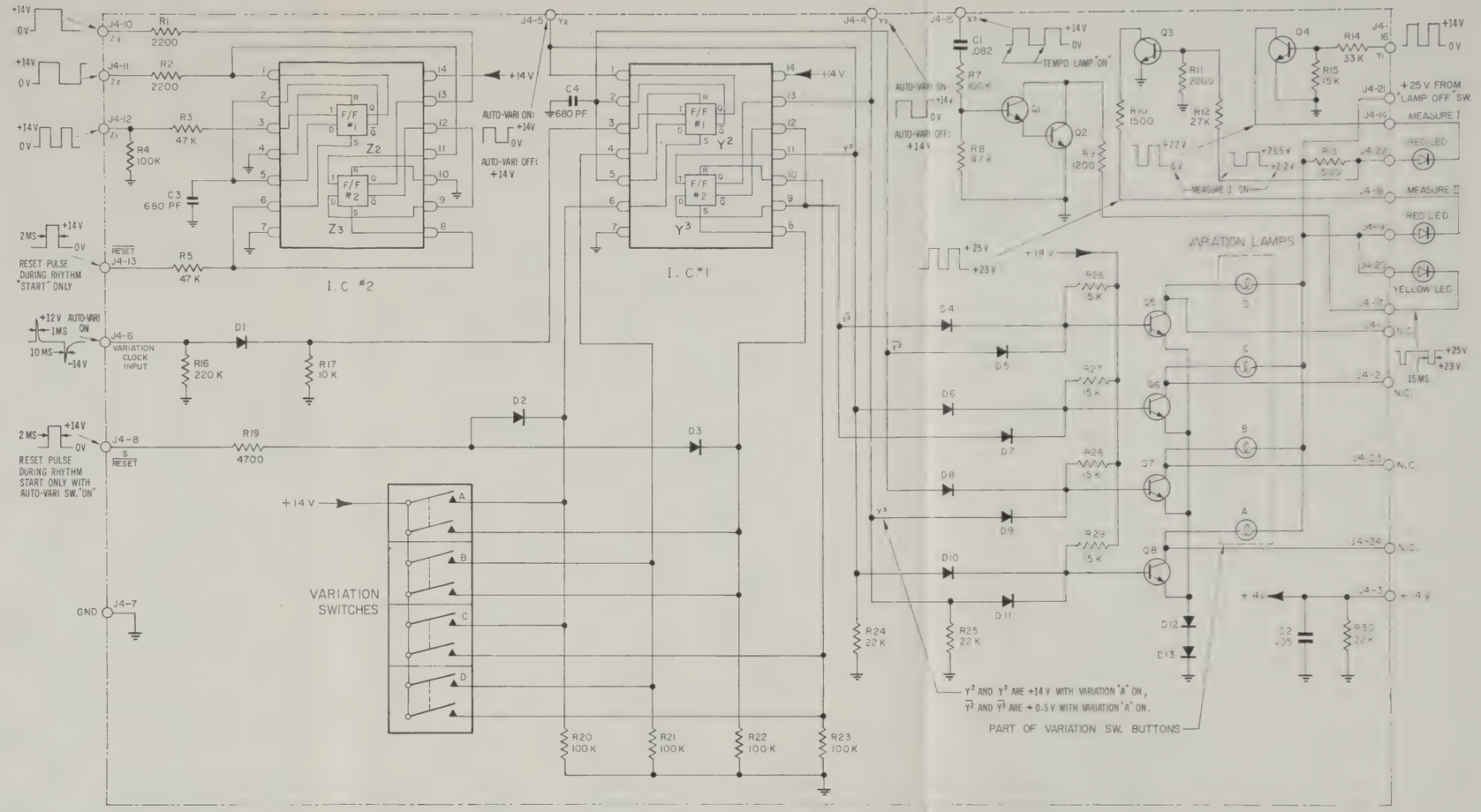
| QTY | DESIGNATION SYMBOL | HAMMOND PART NO. | JEDEC PART NO. |
|---|---|---|---|
| 6 | Q1,Q3,Q4,Q5,Q8,Q12,Q14 | 001-021134 | 2N3394 |
| 6 | Q6,Q7,Q10,Q11,Q13,Q19 | 001-021135 | 2N3394 |
| 2 | Q15,Q16 | 001-021172 | 2N4249 |
| 1 | Q9 | 001-021211 | 2N3565 |
| 2 | Q17,Q18 | 001-021260 | 2N5826 |
| 20 | D1 THRU D20 | 001-026080 | 1N4148 |
| 1 | D21 | 001-023026 | 1N4744 |

| REVISIONS | |
|---|---|
| A | REVISED |
| B | R10 WAS 1M & R103 WAS 390K |
| C | ADDED WAVE FORMS & T.P. NOS. |
| D | R10 WAS 680K & R124 WAS 470. |
| E | C20 WAS .082, R46 WAS 820K. R71 WAS 560K. |

FIGURE 3-5
VOICING BOARD
SCHEMATIC AND LAYOUT
(124-000380)




(EARLY MODELS ONLY)


I.C. #2
I.C. #1
VARIATION SWITCHES
VARIATION LAMPS
AUTO-VARI ON: +14V 0V
AUTO-VARI OFF: +14 V
TEMPO LAMP "ON"
MEASURE I
MEASURE II
RED LED
YELLOW LED
+25 V FROM LAMP OFF SW.
RESET PULSE DURING RHYTHM "START" ONLY
RESET PULSE DURING RHYTHM START ONLY WITH AUTO-VARI SW. "ON"
VARIATION CLOCK INPUT
15 MS
N.C.
Y² AND Y³ ARE +14 V WITH VARIATION "A" ON,
Y² AND Y³ ARE +0.5 V WITH VARIATION "A" ON.
PART OF VARIATION SW. BUTTONS

NOTES:

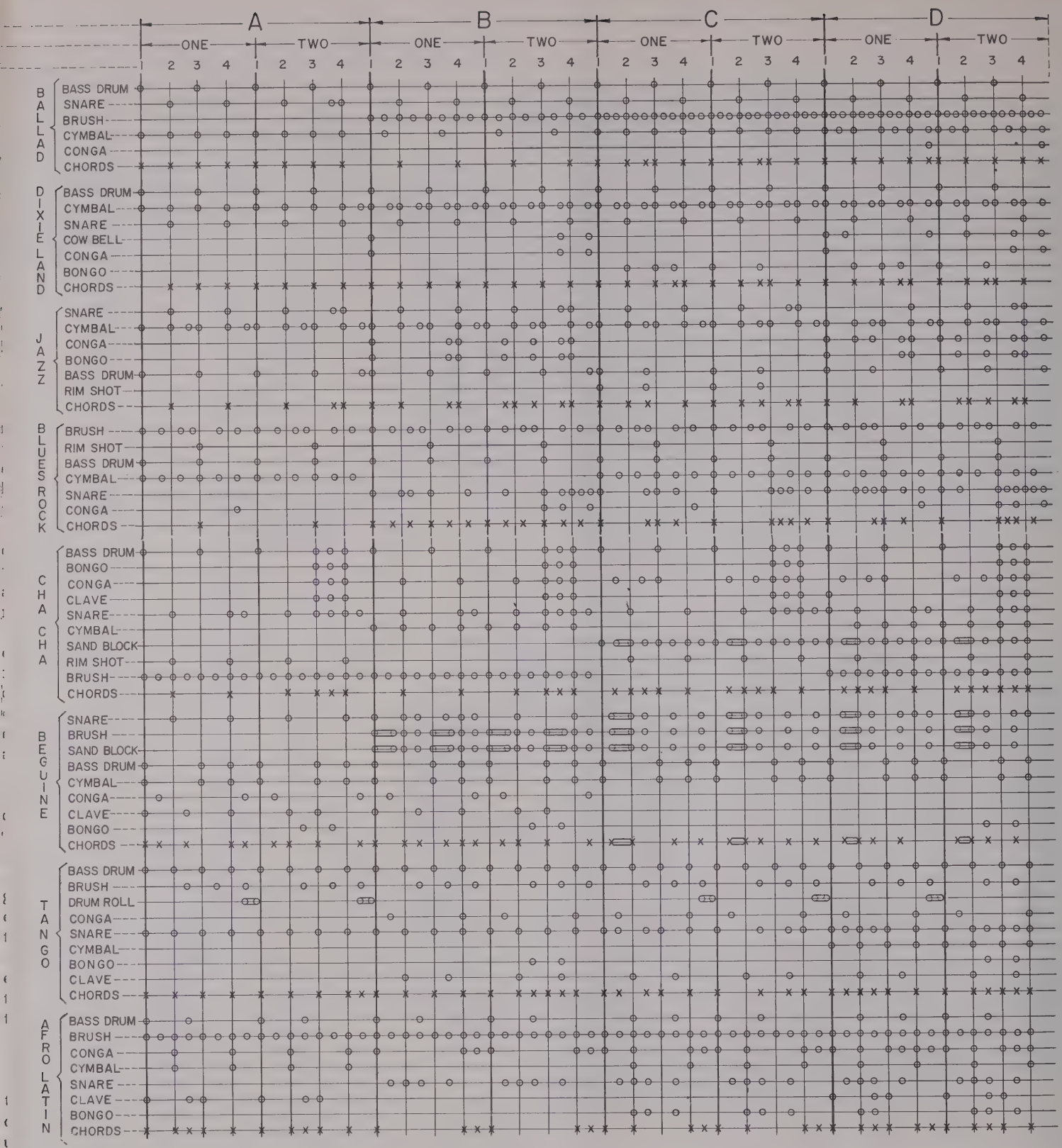
1. UNLESS OTHERWISE SPECIFIED:
   ALL RESISTOR VALUES ARE IN OHMS, 1/2 WATT, ±10%;
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. LAMPS SHOWN ARE G.E.#85.
3. SYMBOL —○— INDICATES EDGE CONNECTOR PIN NUMBER.

| QTY | DESIGNATION SYMBOL | HAMMOND PART # | JEDEC PART # |
|---|---|---|---|
| 8 | Q1 THRU Q8 | 001-021135 | 2N 3394 |
| 13 | D1 THRU D13 | 001-026080 | 1N 4148 |
| 2 | I.C.#1 & I.C.#2 | 075-000100 | ——— |

124-000418
094-050938-F

| REVISIONS | | |
|---|---|---|
| A | C1 WAS .047. R18 WAS 47 K. | |
| B | R2 AND R3 WERE 10K. R17 WAS 100K. R18 22K DELETED. | |
| C | R5 WAS 50K. YELLOW LED WAS GRN. | |
| D | R9 WAS 560. MADE FORMS A FUNCTION VOLTAGE NOTATIONS ADDED. | |
| E | ADDED C3 & C4. R6 DELETED. | |
| F | BD. ASSY NO. WAS 124-000384. | |

FIGURE 3-6
VARIATION BOARD SCHEMATIC
AND LAYOUT
(124-000418)
(124-000384 EARLY MODELS)




# ACKS AND VARIATION CHART

# SECTION IV
# PARTS LIST

AUTO VARI - 64
ACCESSORY MODEL

INDEX


PAGE

AUTO VARI - ACCESSORY MODEL
(FRONT VIEW)..... 4-2
- Music Panel (only)
- Cover(Case) Assembly
- Bottom Panel
- Silent/Sound Switch Assy.
- Knobs (Tempo & Volume & Measures)
- Knobs (Rhythm Patterns)
- Lighted Push Buttons & Lens
- Toggle Cap - (Auto Vari Switch)

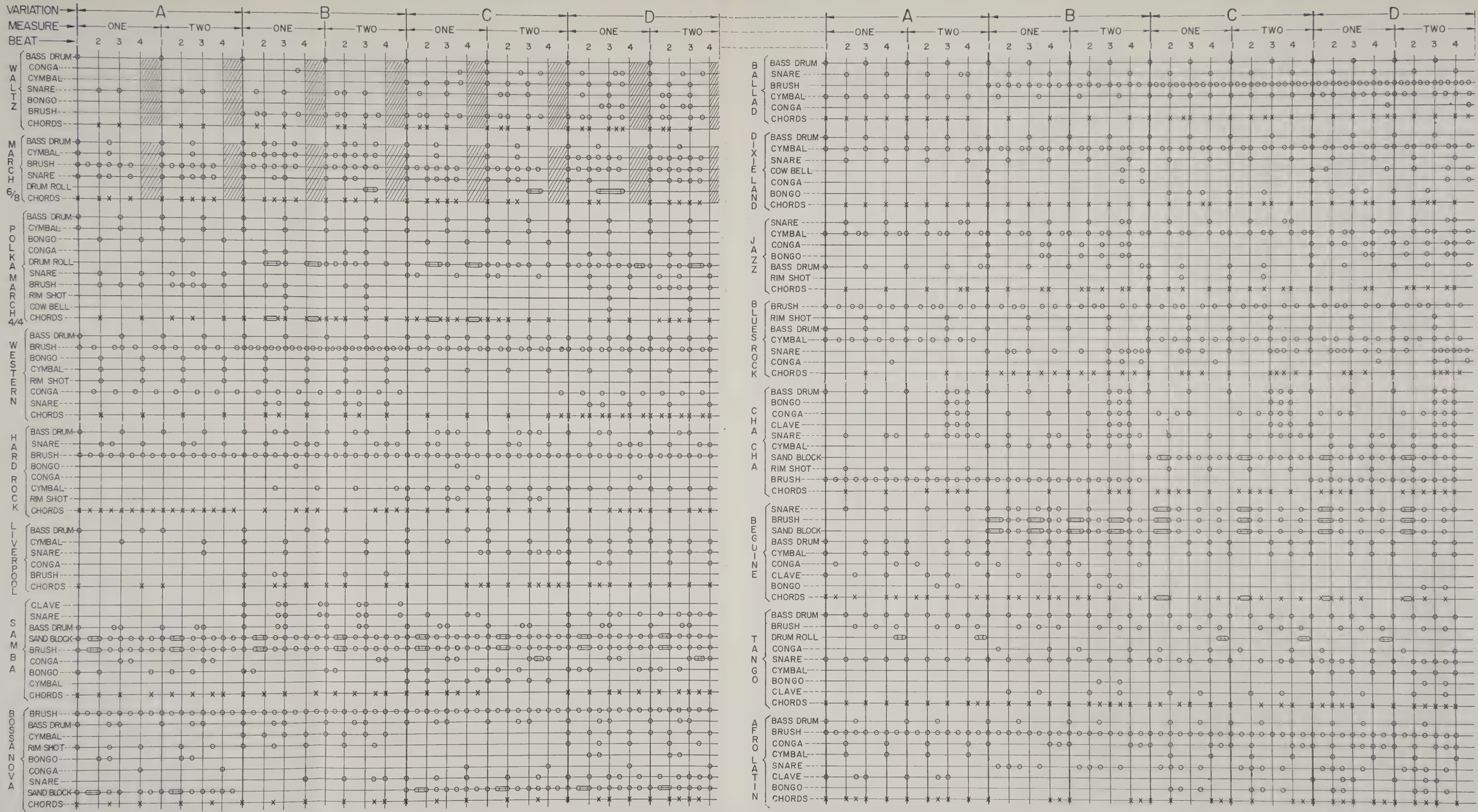
AUTO VARI - ACCESSORY MODEL
(BOTTOM EXPOSED VIEW ..... 4-2
- Back Panel
- Slide Switch (Auto Vari)
- Logo & Bezel
- Control Panel
- Rocker Tab Assy.(Silent/Sound)
- Pattern Generator Board (124-000279)
- Voicing Board (124-000380)
- Edge Connectors

AUTO VARI - ACCESSORY MODEL
(BOTTOM EXPOSED VIEW)..... 4-3
- A.C. Cord Set
- Power Transformer
- Slide Switch & Potentiometers
- Light Emitting Diode (Indicator Lamps)
- Control Panels
- Phone Jacks
- Pattern Gen. Bd..... (124-000279)
- Voicing Board..... (124-000380)
- Variations Board..... (124-000418)
- (Early Production)..... (124-000384)

PAGE

AUTO VARI - ACCESSORY MODEL
(BOTTOM EXPOSED VIEW...4-3
- Power Transformer
- Fuses (.2 Amp)
- Potentiometer
- Phone Jack
- Edge Connectors
- Silicon Rectifiers
- Terminal Strip
- Resistors and Capacitors

PRINTED WIRING BOARDS PARTS LIST.. 4-4
- Pattern Gen. Bd.....(124-000379)
- Voicing Board .....(124-000380)
- Variation Board.....(124-000418)
- Variation Board (Early Production).....(124-000384)




AUTO VARI-64 RHYTHM TRACKS AND VARIATION CHART

FIGURE 3-7
AUTO VARI 64 RHYTHM
TRACK AND VARIATION CHART

# SECTION IV
# PARTS LIST

AUTO VARI - 64
ACCESSORY MODEL

INDEX


PAGE

AUTO VARI - ACCESSORY MODEL
(FRONT VIEW)..... 4-2
- Music Panel (only)
- Cover(Case) Assembly
- Bottom Panel
- Silent/Sound Switch Assy.
- Knobs (Tempo & Volume & Measures)
- Knobs (Rhythm Patterns)
- Lighted Push Buttons & Lens
- Toggle Cap - (Auto Vari Switch)

AUTO VARI - ACCESSORY MODEL
(BOTTOM EXPOSED VIEW ..... 4-2
- Back Panel
- Slide Switch (Auto Vari)
- Logo & Bezel
- Control Panel
- Rocker Tab Assy.(Silent/Sound)
- Pattern Generator Board (124-000279)
- Voicing Board (124-000380)
- Edge Connectors

AUTO VARI - ACCESSORY MODEL
(BOTTOM EXPOSED VIEW)..... 4-3
- A.C. Cord Set
- Power Transformer
- Slide Switch & Potentiometers
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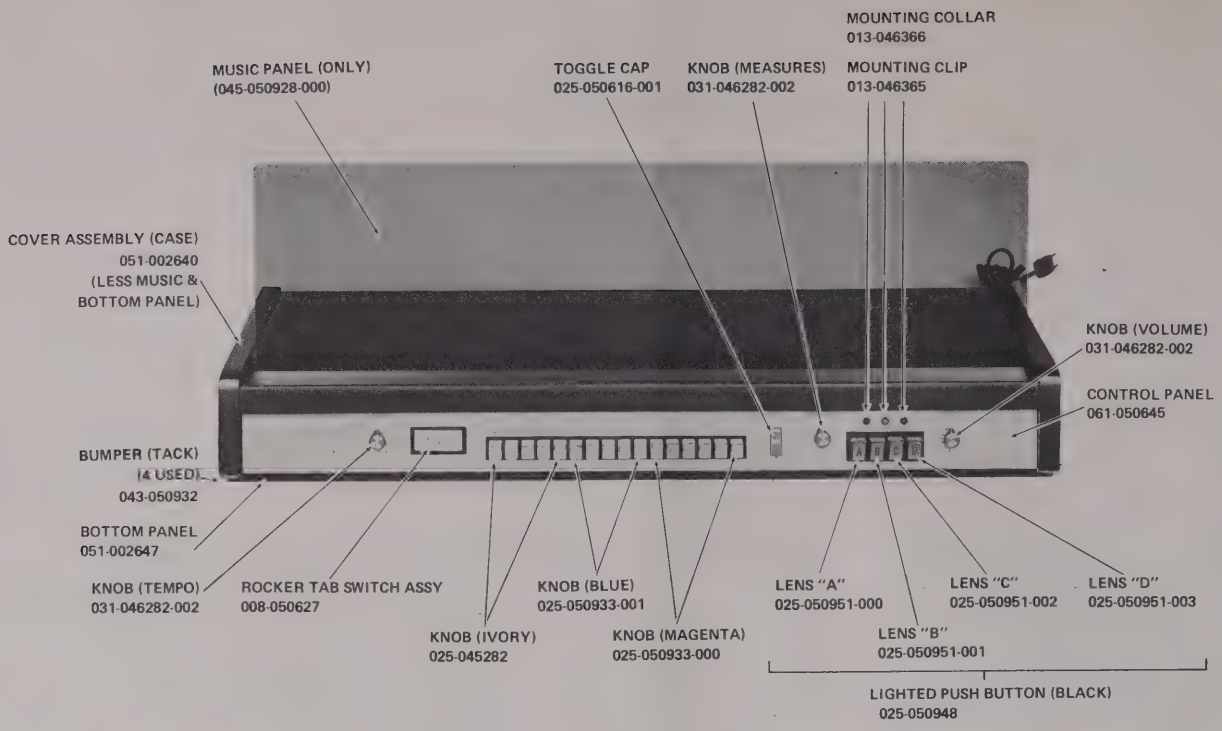
- Phone Jacks
- Pattern Gen. Bd..... (124-000279)
- Voicing Board..... (124-000380)
- Variations Board..... (124-000418)
- (Early Production)..... (124-000384)

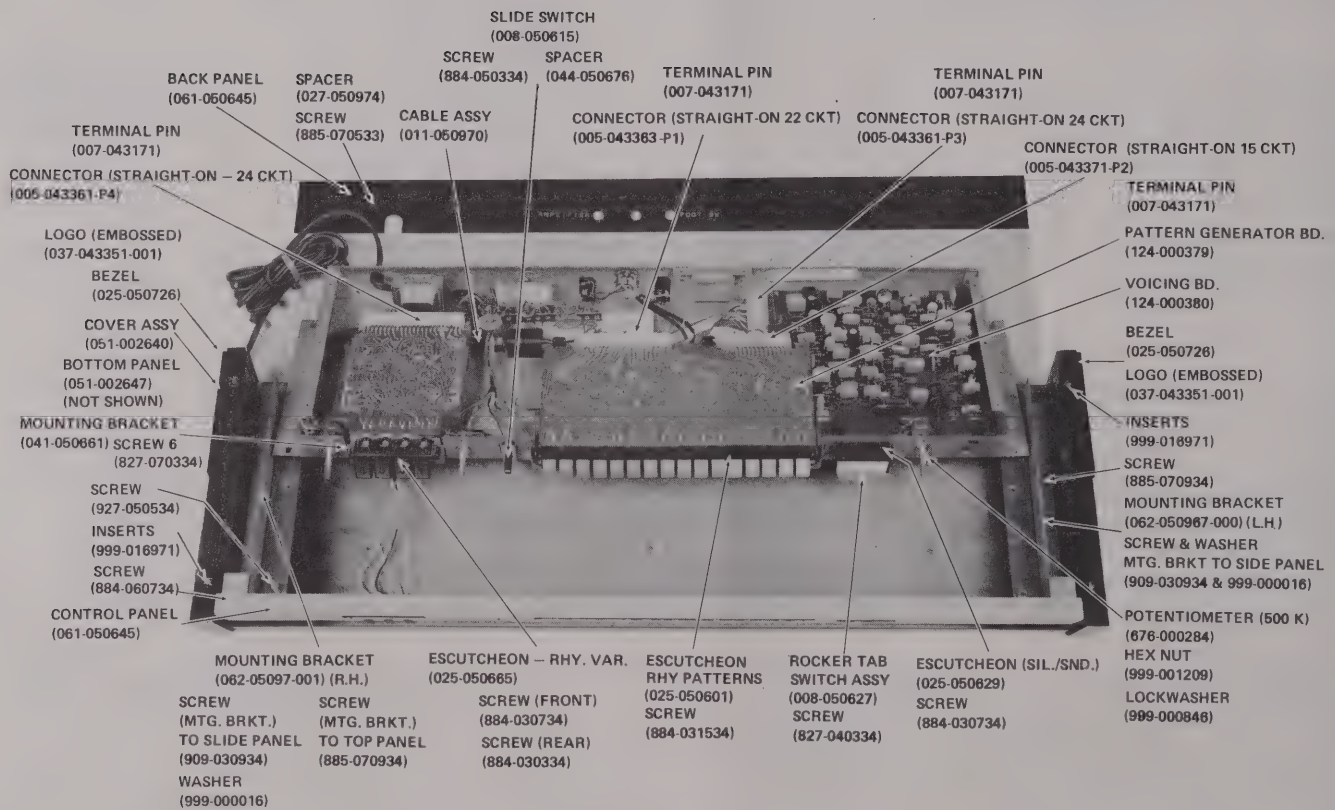
PAGE

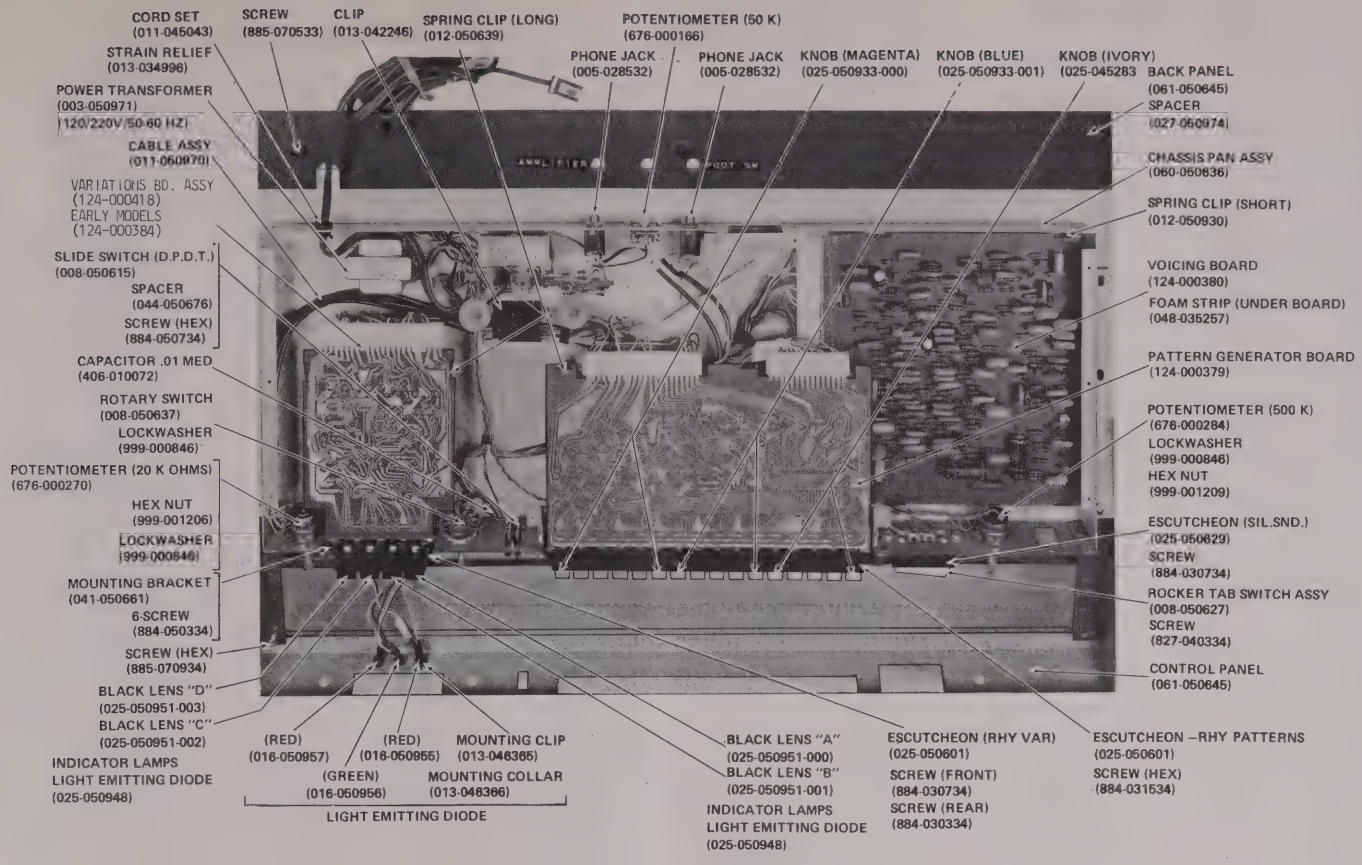
AUTO VARI - ACCESSORY MODEL
(BOTTOM EXPOSED VIEW...4-3
- Power Transformer
- Fuses (.2 Amp)
- Potentiometer
- Phone Jack
- Edge Connectors
- Silicon Rectifiers
- Terminal Strip
- Resistors and Capacitors

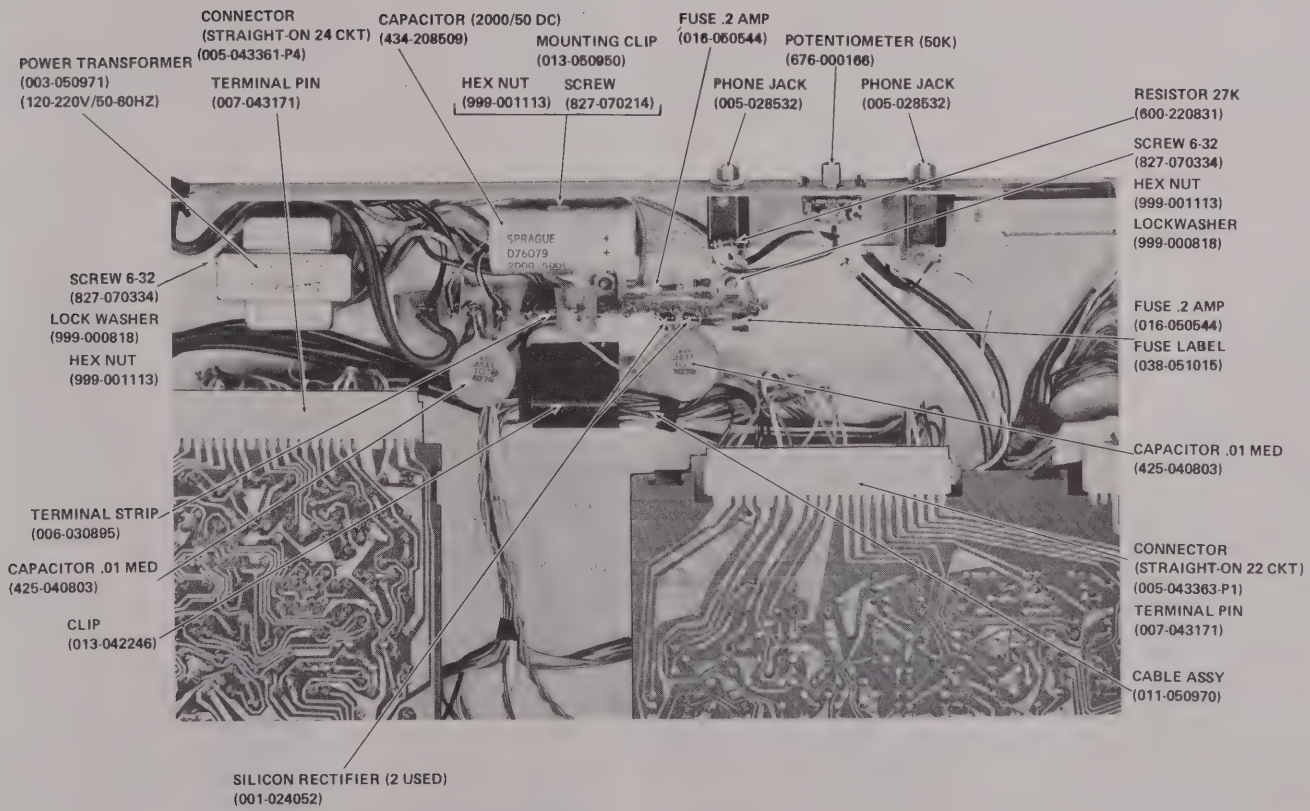
PRINTED WIRING BOARDS PARTS LIST.. 4-4
- Pattern Gen. Bd.....(124-000379)
- Voicing Board .....(124-000380)
- Variation Board.....(124-000418)
- Variation Board (Early Production).....(124-000384)




AUTO–VARI 64 (ACCESSORY UNIT ASSEMBLY)
125-000115-000 (120V/50-60 HZ)
125-000115-001 (220V/50-60 HZ)




CORD SET (011-045043)
SCREW (885-070533)
CLIP (013-042246)
SPRING CLIP (LONG) (012-050639)
POTENTIOMETER (50 K) (676-000166)
STRAIN RELIEF (013-034996)
PHONE JACK (005-028532)
PHONE JACK (005-028532)
KNOB (MAGENTA) (025-050933-000)
KNOB (BLUE) (025-050933-001)
KNOB (IVORY) (025-045283)
BACK PANEL (061-050645)
POWER TRANSFORMER (003-050971) (120/220V/50-60 HZ)
SPACER (027-050974)
CABLE ASSY (011-050970)
CHASSIS PAN ASSY (060-050636)
VARIATIONS BD. ASSY (124-000418) EARLY MODELS (124-000384)
SPRING CLIP (SHORT) (012-050930)
SLIDE SWITCH (D.P.D.T.) (008-050615)
VOICING BOARD (124-000380)
SPACER (044-050676)
FOAM STRIP (UNDER BOARD) (048-035257)
SCREW (HEX) (884-050734)
CAPACITOR .01 MED (406-010072)
PATTERN GENERATOR BOARD (124-000379)
ROTARY SWITCH (008-050637)
POTENTIOMETER (500 K) (676-000284)
LOCKWASHER (999-000846)
LOCKWASHER (999-000846)
POTENTIOMETER (20 K OHMS) (676-000270)
HEX NUT (999-001209)
HEX NUT (999-001206)
ESCUTCHEON (SIL.SND.) (025-050829)
LOCKWASHER (999-000846)
SCREW (884-030734)
MOUNTING BRACKET (041-050661)
ROCKER TAB SWITCH ASSY (008-050627)
6-SCREW (884-050334)
SCREW (827-040334)
SCREW (HEX) (885-070934)
CONTROL PANEL (061-050645)
BLACK LENS "D" (025-050951-003)
BLACK LENS "C" (025-050951-002)
(RED) (016-050957)
(RED) (016-050955)
MOUNTING CLIP (013-046365)
(GREEN) (016-050956)
MOUNTING COLLAR (013-046366)
LIGHT EMITTING DIODE
INDICATOR LAMPS LIGHT EMITTING DIODE (025-050948)
BLACK LENS "A" (025-050951-000)
BLACK LENS "B" (025-050951-001)
INDICATOR LAMPS LIGHT EMITTING DIODE (025-050948)
ESCUTCHEON (RHY VAR) (025-050601)
SCREW (FRONT) (884-030734)
SCREW (REAR) (884-030334)
ESCUTCHEON –RHY PATTERNS (025-050601)
SCREW (HEX) (884-031534)


CONNECTOR (STRAIGHT-ON 24 CKT) (005-043361-P4)
CAPACITOR (2000/50 DC) (434-208509)
MOUNTING CLIP (013-050950)
FUSE .2 AMP (016-050544)
POTENTIOMETER (50K) (676-000166)
POWER TRANSFORMER (003-050971) (120-220V/50-60HZ)
TERMINAL PIN (007-043171)
HEX NUT (999-001113)
SCREW (827-070214)
PHONE JACK (005-028532)
PHONE JACK (005-028532)
RESISTOR 27K (600-220831)
SCREW 6-32 (827-070334)
HEX NUT (999-001113)
LOCKWASHER (999-000818)
SCREW 6-32 (827-070334)
LOCK WASHER (999-000818)
HEX NUT (999-001113)
FUSE .2 AMP (016-050544)
FUSE LABEL (038-051015)
CAPACITOR .01 MED (425-040803)
TERMINAL STRIP (006-030895)
CAPACITOR .01 MED (425-040803)
CONNECTOR (STRAIGHT-ON 22 CKT) (005-043363-P1)
TERMINAL PIN (007-043171)
CLIP (013-042246)
CABLE ASSY (011-050970)
SILICON RECTIFIER (2 USED) (001-024052)

## 124-000379 PATTERN GENERATOR BOARD

| | | |
|---|---|---|
| PWB (No Parts) | | 023-050654 |
| TRANSISTORS | | |
| Q1 | | 001-026050 |
| Q2-Q6,Q11,Q12,Q16,Q17 | | 001-021133 |
| Q7,Q8,Q15 | | 001-021172 |
| Q13,Q14 | | 001-021135 |
| DIODES | | |
| Signal | | |
| D1,D3-D14 | | 001-226080 |
| INTEGRATED CIRCUI1 | | |
| IC-1 | | 075-000430 |
| RESISTORS (Ohms) | | |
| 47 | | 600-220171 |
| 470 | | 600-220411 |
| 1K | | 600-220491 |
| 1.5K | 5% | 600-220532 |
| 2.2K | | 600-220571 |
| 3.6K | 5% | 600-220622 |
| 4.7K | | 600-220651 |
| 10K | | 600-220731 |
| 22K | | 600-220811 |
| 27K | | 600-220831 |
| 47K | | 600-220891 |
| 68K | | 600-220931 |
| 91K | 5% | 600-220962 |
| 100K | | 600-220971 |
| 150K | | 600-221011 |
| 220K | | 600-221051 |
| 270K | 5% | 600-221072 |
| 470K | | 600-221131 |
| 820K | 5% | 600-221192 |
| CAPACITORS | | |
| Mylar | | |
| .01 MFD | | 412-110462 |
| .047 MFD | | 412-110512 |
| .10 MFD | | 412-110512 |
| .068 MFD | | 412-110632 |
| .27 MFD | | 412-110672 |
| Ceramic | | |
| .01 MFD, 500V | | 426-010743 |
| .05 MFD, 100V | | 427-170095 |
| Switch Assembly, Rhythm | | 008-050612 |

## 124-000380 VOICING BOARD

| | | |
|---|---|---|
| PWB (No Parts) | | 023-050669 |
| TRANSISTORS | | |
| Q1-Q5,Q8,Q12,Q14 | | 001-021134 |
| Q6,Q7,Q10,Q11,Q13,Q19 | | 001-021135 |
| Q9 | | 001-021211 |
| Q15,Q16 | | 001-021172 |
| Q17,Q18 | | 001-021260 |
| Socket | | 004-048898 |
| DIODES | | |
| Signal | | |
| D1-D20 | | 001-026080 |
| Zener | | |
| 14V,1W D21 | | 001-023026 |
| RESISTORS (Ohms) | | |
| 47 | | 600-220171 |
| 68 | | 600-220211 |
| 560 | | 600-220431 |
| 820 | 5% | 600-220472 |
| 1.2K | | 600-220511 |
| 1.5K | | 600-220531 |
| 2.2K | | 600-220571 |
| 4.7K | | 600-220651 |
| 5.6K | | 600-220671 |
| 10K | 5% | 600-220732 |
| 12K | 5% | 600-220752 |
| 22K | 5% | 600-220812 |
| 27K | 5% | 600-220832 |
| 33K | 5% | 600-220852 |
| 39K | | 600-220871 |
| 47K | 5% | 600-220892 |
| 68K | 5% | 600-220932 |
| 100K | 5% | 600-220972 |
| 180K | 5% | 600-221032 |
| 220K | 5% | 600-221052 |
| 330K | 5% | 600-221092 |
| 470K | 5% | 600-221132 |
| 560K | 5% | 600-221152 |
| 680K | 5% | 600-221172 |
| 820K | 5% | 600-221192 |
| 1.5M | 5% | 600-221252 |
| 1.8M | 5% | 600-221272 |
| 2.2M | 5% | 600-221292 |
| 3.3M | | 600-221331 |
| 5.6M | | 600-221391 |
| 6.8M | | 600-221411 |
| 8.2M | | 600-221431 |
| 180, 3W | | 602-050201 |
| 10K Trimmer Pot 1/8W | | 676-000064 |
| 50K Trimmer Pot 1/8W | | 676-000069 |
| CAPACITOR (MFD) | | |
| Mylar | | |
| .0012 | | 412-110582 |
| .0022 | | 412-110592 |
| .0039 | | 412-110682 |
| .0056 | | 412-110692 |

## 124-000380 VOICING BOARD CONTINUED

| | | |
|---|---|---|
| .0082 | | 412-110602 |
| .01 | | 412-110462 |
| .012 | | 412-110612 |
| .015 | | 412-110472 |
| .022 | | 412-110482 |
| .003 | | 412-110502 |
| .047 | | 412-110512 |
| .056 | | 412-110622 |
| .068 | | 412-110632 |
| .082 | | 412-110662 |
| .10 | | 412-110522 |
| .15 | | 412-110642 |
| .22 | | 412-110532 |
| .27 | | 412-110672 |
| Ceramic | | |
| .00033 | | 426-010372 |
| .00056 | | 426-010442 |
| .00068 | | 426-010462 |
| .00082 | | 426-010482 |
| .001 | | 426-010502 |
| .0015 | | 426-010542 |
| .0022 | | 426-010582 |
| .0027 | | 426-010602 |
| .0039 | | 426-010642 |
| .0047 | | 426-010662 |
| .0082 | | 426-010723 |
| Tantalum | | |
| .047 | 35V | 435-474352 |
| 1.0 | 35V | 435-105354 |
| Electrolytic | | |
| 10 | 50V | 432-106509 |
| 200 | 35V | 431-207359 |
| Choke | | |
| 45mH | L1,L2 | 003-030753 |

## 124-000384 VARIATION BOARD

| | |
|---|---|
| PWB (No Parts) | 023-050937 |
| TRANSISTORS | |
| Q1-Q8 | 001-021135 |
| DIODES | |
| Signal | |
| D1-D13 | 001-026080 |
| INTEGRATED CIRCUIT | |
| IC-1,IC-2 | 075-000100 |
| RESISTOR | |
| 1.2K | 600-220511 |
| 1.5K | 600-220531 |
| 2.2K | 600-220571 |
| 10K | 600-220731 |
| 15K | 600-220771 |
| 22K | 600-220811 |
| 27K | 600-220831 |
| 33K | 600-220851 |
| 47K | 600-220891 |
| 100K | 600-220971 |
| 220K | 600-221051 |
| CAPACITOR | |
| Mylar | |
| .082MFD | 412-110662 |
| Ceramic | |
| .05 MFD 100V | 427-170095 |
| Switch, Variation | 008-050673 |
| Lamp, Indicator | 016-050949 |

## 124-000418 VARIATION BOARD

| | |
|---|---|
| PWB (No Parts) | 023-050937 |
| TRANSISTORS | |
| Q1-Q8 | 001-021135 |
| DIODES | |
| Signal | |
| D1-D13 | 001-026080 |
| INTEGRATED CIRCUIT | |
| IC-1, IC-2 | 075-000100 |
| RESISTOR | |
| 1.2K | 600-220511 |
| 1.5K | 600-220531 |
| 2.2K | 600-220571 |
| 4.7K | 600-220851 |
| 10K | 600-220731 |
| 15K | 600-220771 |
| 22K | 600-220811 |
| 27K | 600-220831 |
| 33K | 600-220851 |
| 47K | 600-220891 |
| 100K | 600-220971 |
| 220K | 600-221051 |
| CAPACITOR | |
| Mylar | |
| .082MFD | 412-110662 |
| Ceramic | |
| .00068MFD 500V | 426-010462 |
| .05 MFD 100V | 427-170095 |
| Switch, Variation | 008-050673 |
| Lamp, Indicator | 016-050949 |

HO-1290 - 4M - 9/74

PRINTED U.S.A.

FPS – 1974

# Hammond Service News

HAMMOND ORGAN COMPANY • A DIVISION OF HAMMOND CORPORATION • SERVICE DEPARTMENT

11610 Copenhagen Court • Franklin Park, Ill. 60131 312—766-6950

VOLUME 6 NUMBER 4

SEPTEMBER, 1974

## AUTO VARI 64 SERVICE MANUAL

You will find enclosed a copy of the Auto Vari 64 Service Manual, HO-1290. This manual covers only the accessory model.

Also included is a separate print of the Logic Diagram of Auto Vari 64. An error was discovered on this print right after printing. A corrected copy is enclosed. Please remove immediately from the manual page 3-2, figure 3-1 and replace with corrected copy.

## REMOVAL OF TRANSIENT SUPPRESSION DIODES

It has been determined that the internal static protection device built into each IC is sufficient to prevent damage to the chip. The combined failure rate for the vast numbers of diodes used for the purpose of IC protection is several magnitudes higher than for the IC, the end result being that the external diodes cause more problems than they eliminate. Furthermore, when the PWB's are in a complete system all sensitive lines are at a low impedance and the need for more protection no longer exists.

PWB's affected:

124-000265)
124-000266) MDD
124-000318)

Daughter Boards:

| | |
|---|---|
| (124-000193 | Lower Manual 380 Divider Keyers |
| (124-000259 | Synthesis 380 Percussion Divider Keyer |
| (124-000256 | Upper Manual 380 Divider Keyers |
| (124-000291 | 424 Staircase Keyer |
| (124-000215 | 427 Divider Keyer |
| 124-046769 ) | Bright Percussion |
| 124-046769-001) | 380 Divider Keyer Boards |
| 124-000307 | 380 Generator Keyer |
| 124-000319 | 429 Generator - Keyer Board Assembly |

Latest versions of the above boards are being produced without external diode protection.

It is well to remember, however, that loose PWB's still must be handled with care, especially when the relative humidity is low the enviroment is conducive to static electricity build-up.

It is recommended that in transporting loose, individual boards they be wrapped in tin or aluminum foil or have conductive chips to short all the contact pins together.

ALL precautions in handling that have been experienced in the past still apply.

IN ALL CASES, THE BOARDS WITHOUT THE PROTECTIVE DIODES WILL OPERATE SATISFACTORILY IN PLACE OR THOSE WHICH CONTAIN THESE COMPONENTS.

A green sheet has been included with this newsletter for each of the PWB's listed above indicating their respective diodes that are removed.

## SERVICE SCHOOL NOTES

The Service Schools have been well attended. We have also received a number of favorable compliments on the curriculm and presentation for which we appreciate. All classes secheduled for the remainder of this year are filled. A new schedule of classes for the coming year will be announced in a future Service News.

The following men attended the Basic Service School beginning the week of June 3.

| | |
|---|---|
| Craig McClure | Traverse City, Mich. |
| David L. Cook | Janesville, Wis. |
| Paul Setlak | Traverse City, Mich. |
| Alan A. Drake | Transfer, Pa. |
| Brad Snow | Corona del Mar, Calif. |
| Daniel Burrows | Madison, Wis. |
| T. A. Richerson | Memphis, Tenn. |
| E. Spaulding | Indianapolis, Ind. |
| Jeff La Mar | Indianapolis, Ind. |
| Jerry Dalton | Knoxville, Tenn. |

The following men attended the Intermediate Service School beginning the week of June 24.

| | |
|---|---|
| A. Spaulding | Indianapolis, Ind. |
| Jeff La Mar | Indianapolis, Ind. |
| Norbert Allcox | Chicago, Ill. |
| Joseph Truesdale | Chicago, Ill. |
| J. Schweitzer | Chicago, Ill. |
| Arthur Mangrum | Chicago, Ill. |
| William Krisher | Huntsville, Ala. |
| Martin Lindquist | Edina, Minn. |
| Jan Koetsier | Van Wert, Ohio |
| Kenneth Michel | Mexico City, Mex. |
| Hector Tellez | Mexico City, Mex. |

The following men attended the Basic Service School beginning the week of July 29.

| | |
|---|---|
| W. A. Edwards | Amarillo, Texas |
| Richard Stein | South Bend, Ind. |
| Emerson King | Springfield, Ohio |
| Walter G. Clegg | Goldsboro, N. C. |
| Thomas L. Baird | Kankakee, Ill. |
| John Bivens | Franklin Park, Ill. |
| M. Popovich | Franklin Park, Ill. |
| G. J. Huszai | Cleveland, Ohio |
| James Tighe | Utica, N. Y. |
| D. J. Prouty | Sheboygan, Wis. |
| Terry Maahs | Petoskey, Mich. |
| Archie Lambert | Hastings, Nebr. |
| Paul Hanson | Longview, Wash. |
| Albert Miyasoto | San Antonio, Tex. |

The following men attended the Intermediate Service School beginning the week of August 19.

| | |
|---|---|
| C. Casey | Memphis, Tenn. |
| C. Haynam | Canton, Ohio |
| R. Skelton | Las Vegas, Nev. |
| David Cook | Janesville, Wis. |
| Harold McCray | Janesville, Wis. |
| F. C. Kirkby | Traverse City, Mich. |
| Jerry Siddock | Flint, Mich. |
| C. McClure | Traverse City, Mich. |
| Alan Drake | Transfer, Pa. |
| A. Malehorn | Harrisburg, Pa. |
| E. Osborn | Indianapolis, Ind. |
| M. McKinley | Indianapolis, Ind. |
| W. Clegg | Goldsboro, N. C. |
| R. Stein | South Bend, Ind. |
| Alan Sauer | Chicago, Ill |
| D. Prouty | Sheboygan, Wis. |
| M. J. Palermo | Chicago, Ill. |
| W. Rathman | Chicago, Ill. |

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: REMOVAL OF TRANSIENT SUPPRESSION DIODES FROM MDD PWB ASSEMBLIES

Model ALL MODELS WITH MDD MASTER OSCILLATOR BOARDS

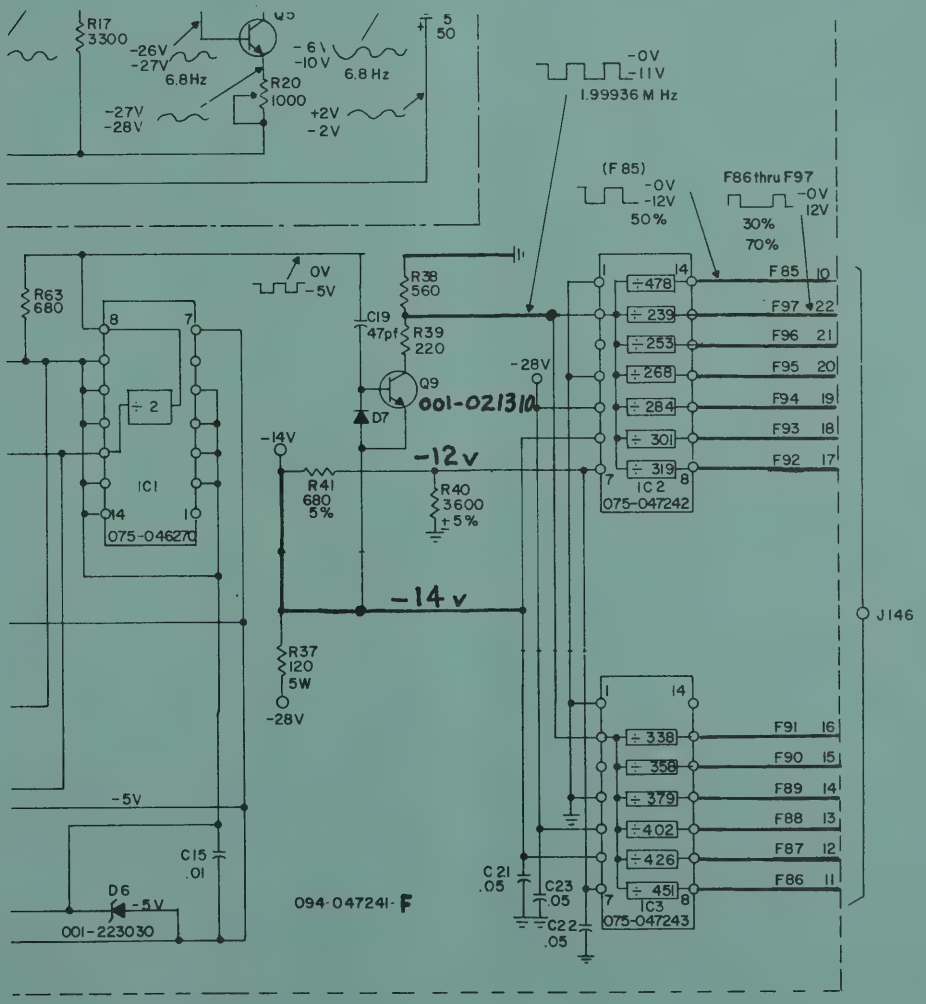
NATURE OF CHANGE:

124-000318-00A - Diodes D12 through D24 removed
R37 added

124-000265-00A - Diodes D12 through D24 removed
R37 added

124-000266-00A - Diodes D12 through R24 removed
R37 added

NOTE: Diodes D8 through D11 were previously removed from the MDD Boards along with R37, R39, and C20. R37 had to be reinstalled in the board to maintain current requirements. The area in the schematic for the MDD boards affected is shown below in its most up to date form.



Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: REMOVAL OF TRANSIENT SUPPRESSION DIODES
124-000193 (DAUGHTER BOARDS)

Model 4000
REGENT

NATURE OF CHANGE:

Diodes D26 through D43 removed.

This change has improved the quality and the reliability of this assembly.

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: REMOVAL OF TRANSIENT SUPPRESSION DIODES
124-000256-00A and 124-000259-00A
(DAUGHTER BOARDS)

Model CONCORDE
2100

NATURE OF CHANGES:

124-000256-00A - Diodes D16 through D33 removed.

124-000259-00A - Diodes D1 through D18 removed.

This change has improved the quality and the reliability of these assemblies.

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: TRANSIENT SUPPRESSION DIODES REMOVED FROM 124-000291 (DAUGHTER BOARDS)

Model 4100 REGENT

NATURE OF CHANGE:

Diodes D40, D41, and D42 removed.

This change has improved the quality and reliability of this assembly.

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: TRANSIENT SUPPRESSION DIODES REMOVED FROM 124-000215 (DAUGHTER BOARDS)

Model 1100 PHOENIX

NATURE OF CHANGE:

Diodes D3 and D4 removed.

This change has improved the quality and reliability of these assemblies.

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: TRANSIENT SUPPRESSION DIODES REMOVED FROM 124-046769 AND 124-046769-001 BRIGHT PERCUSSION DIVIDER KEYER BOARDS.

Model 2100 CONCORDE

NATURE OF CHANGES:

124-046769 - Diodes D7, D8, D9, and D10 removed

124-046769-001 - Diodes D7, D8, D9, and D10 removed

These changes have improved the quality and reliability of these asemblies.

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: REMOVAL OF TRANSIENT SUPPRESSION DIODES 124-000307 380 GENERATOR KEYER BOARD ASSEMBLY

Model 7100 COUGAR

NATURE OF CHANGE:

Diodes D1 to D24 and D69 through D77 removed.

This change has improved the quality and the reliability of this assembly.

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: TRANSIENT SUPPRESSION DIODES REMOVED FROM 124-000319 (DAUGHTER BOARDS)

Model DOLPHIN 9000

NATURE OF CHANGE:

Diodes D1 through D12 removed.

This change has improved the quality and the reliability of the assemblies.

Hammond Service News Volume 6 Number 4
SEPTEMBER, 1974

SUBJECT: NEW KEY COMB LUBRICANT (015-048147)

Model H-300, L-SERIES, T-500, R-SERIES

A recent change in production has resulted in the discontuation of the black colored molycote lubricant.

The new lubricant is a silicone grease - GE Type G 662 - available as a shelf item at many distributors of GE silicone products.

The silicone lubricant (part number 015-048147) is available from the Hammond Spare Parts Department.

## A NOTE CONCERNING APPLICATION

It is not necessary to remove the old molycote before applying the new silicone lubricant. The two types mix well together.

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

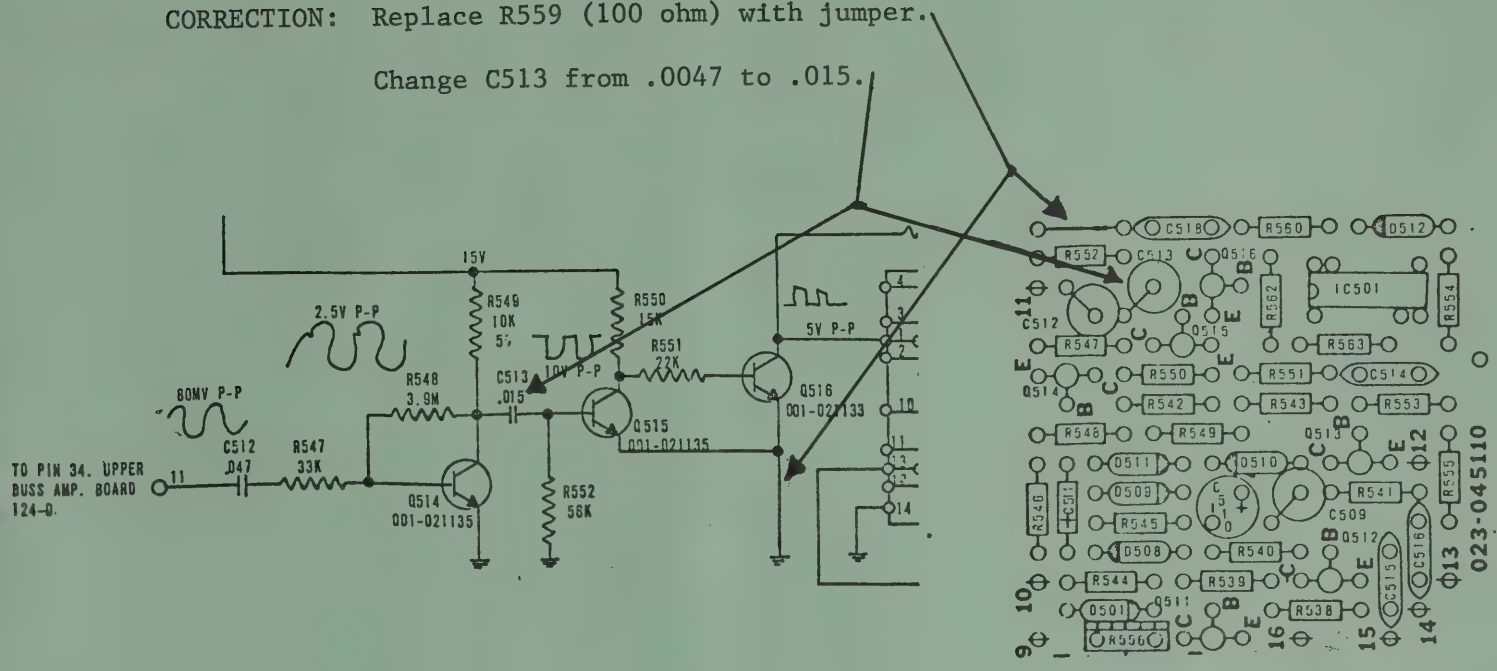
SUBJECT: TRIGGER RELIABILITY IMPROVEMENT
REFERENCE: 124-000170 PERCUSSION BOARD

Model T-500

SYMPTOM: Intermittent 1¼ harmonic divider IC-501 triggering. (1¼ Harmonic is part of chime voice on percussion)

CORRECTION: Replace R559 (100 ohm) with jumper.

Change C513 from .0047 to .015.




SUBJECT: PART NUMBER CORRECTIONS

NATURE OF CHANGE:

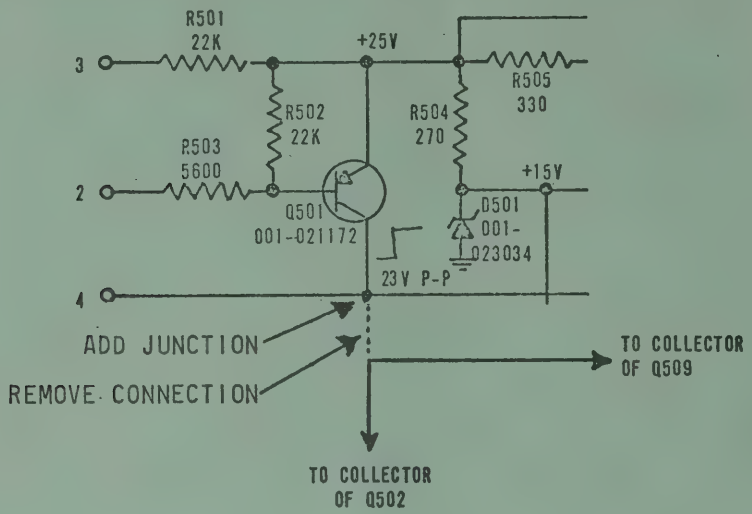
1. Refer to page 6-5, of service manual, console-top front view. Lower manual right hand end block part number should be 025-046747 instead of 025-028407.

2. Refer to page 6-6, console rear view, top connector number should be 005-043363 instead of 005-043304.

Hammond Service News Volume 6 Number 4
SEPTEMBER, 1974

SUBJECT: SCHEMATIC CORRECTION Model T-500

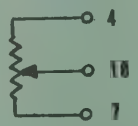
REFERNCE: Figure 5-10 page 5-11 of T-500 service manual. Change schematic as indicated below.




Q501 is the Upper Manual touch response transistor. When a key is depressed, it turns on placing +23 V on the collector of Q507. Q507 and Q506 make up an oscillator called an astable multivibrator.

+23 V is also placed through D502 to Q508's and 502's collectors allowing them to operate.

The reiteration rate control is connected as shown.




When a key is depressed with the reit tab depressed Q501 supplies DC for the operation of the multivibrator Q506 and Q507. This CKT supplies the gate pulses alternately to the differential gate amps Q502, Q503, Q504, Q505, Q508, Q509, Q510 and Q511.

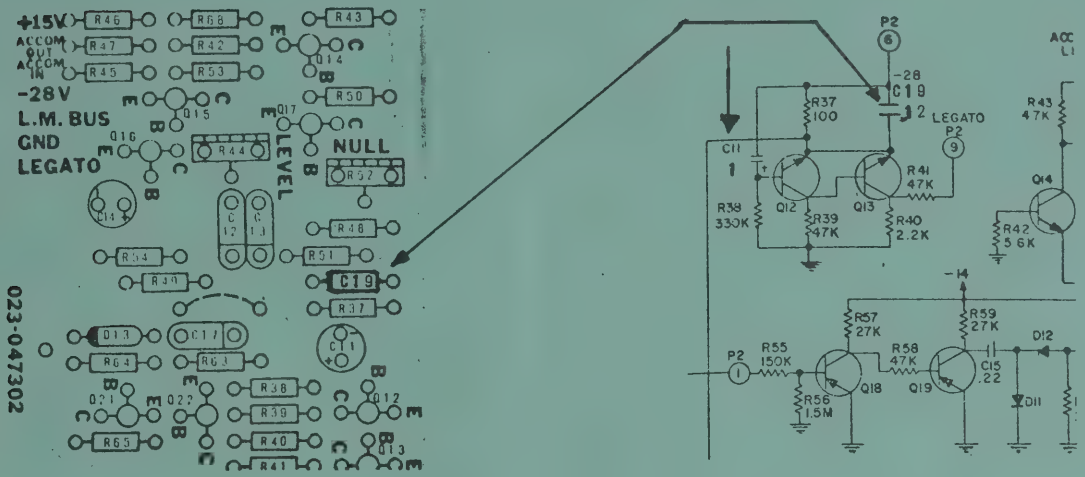
Q501 also supplies DC for Q502 and Q508 with the depression of a key. This allows the differential gates to operate when told to do so by the multi-vibrator.

Hammond Service News Volume 6 Number 4
SEPTEMBER, 1974

Model 1100
PHOENIX

SUBJECT: DOUBLE KEYING ON ACCOMPANIMENT MANUAL
REFERENCE: 124-000268-00A PEDAL AND ACCOMPANIMENT PWB. FIGURE 3-7, PAGE 3-8, PHOENIX SERVICE MANUAL, HO-1259

CORRECTION: Diode D10 was deleted and replaced by capacitor C19, .12 MFD. Capacitor C11 was also changed from 5 MFD to 1 MFD.




SUBJECT: NOISE REDUCTION
REFERENCE: 124-000267 PRE-AMP MIXER PWB FIGURE 3-12, PAGE 3-13, PHOENIX SERVICE MANUAL HO-1259

CORRECTION: Change transistor Q1, Q4, Q5, Q6, Q7 from part number 001-021133 to low noise silicon transistor part number 001-021260.

Hammond Service News Volume 6 Number 4
SEPTEMBER, 1974

SUBJECT: TOUCH RESPONSE CLICK
REFERENCE: 124-000222 REITERATION PWB

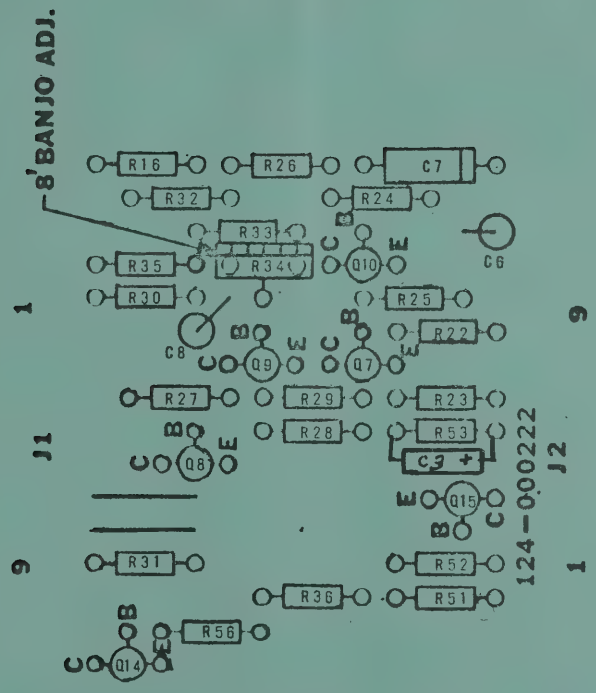
Model 3100, 3200
PIPER

SYMPTOM: A click or pop is present when the BANJO and/or MARIMBA tabs are "ON" and a key is depressed.

CORRECTION: Install .68 MFD/35 v (414-0500072) tantalum capacitor C3 across resistor R53 (27K). Negative end of capacitor to ground. Location as shown below.

NOTE: In production, this capacitor is located at Banjo switch in Control panel. This change has been incorporated in units as follows.

3112 - S/N 357034 and above
3212 - S/N 329435 and above
3227 - S/N 311168 and above



Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

SUBJECT: HAMMOND GENERATOR OIL

Model ALL TONE WHEEL GENERATOR MODELS

In the past there have been two types of Hammond generator oil available. The noticeable difference is that one type is clear in color and the other has a yellow cast in the color.

When using this oil in lubricating Hammond Organs, both types are fine for lubrication of generator. When lubricating the self start motors, use only the yellow colored oil. DO NOT USE THE CLEAR.

The clear oil has not been shipped for approximately one year. We stock only the yellow oil.

Hammond Service News Volume 6 Number 4

SEPTEMBER, 1974

Model HAMMOND TWO SPEED AND DELUXE TREMOLO UNITS

SUBJECT: TREMOLO MOTOR FAILURE

A possible cause of high speed motor burnouts has been traced to the low speed motor shaft engaging the idler wheel during shipment, and preventing the high speed motor from turning.

This locked condition will clear itself if the low speed motor is energized prior to using the high speed. Once cleared, the locked condition does not recur.

ALL DEALERS AND TECHNICIANS ARE ADVISED TO FOLLOW THE PROCEDURE OF ENERGIZING THE LOW SPEED TREMOLO FIRST, FOLLOWED BY THE HIGH SPEED. VERIFY THAT THE DRUM IS ROTATING IN BOTH MODES WHEN INSTALLING ORGANS.

# TION III
# S AND TEXT

hematic diagrams and text to illustrate and
oper Auto Vari servicing.

## STRATIONS

ACCESSORY


| | Page |
|---|---|
| . . . . . | 3- 1 |
| . . . . . | 3- 2 |
| . . . . . | 3- 3 |
| . . . . . | 3- 4 |
| . . . . (124-000379) . . | 3- 5 |
| . . . . (124-000380) . . | 3- 6 |
| . . . . (124-000418) . . | 3- 7 |
| rly Model 124-000384) . . . . . | 3- 8 |

# SECTION III
# DIAGRAMS AND TEXT

3-1 GENERAL -- This section contains schematic diagrams and text to illustrate and provide information necessary to proper Auto Vari servicing.

## LIST OF ILLUSTRATIONS

### AUTO VARI-64-ACCESSORY


| Figure | | | Page |
|---|---|---|---|
| | General and List of Illustrations | | 3- 1 |
| 3- 1 | Logic Diagram Auto Vari-64 Accessory Model | | 3- 2 |
| 3- 2 | Theory of Operation Auto Vari -64 (Sheet 1 of 2) | | 3- 3 |
| 3- 3 | Theory of Operation Auto Vari -64 (Sheet 2 of 2) | | 3- 4 |
| 3- 4 | Pattern Generator Board-Schematic and Layout | (124-000379) | 3- 5 |
| 3- 5 | Voicing Board-Schematic and Layout | (124-000380) | 3- 6 |
| 3- 6 | Variation Board-Schmatic and Layout | (124-000418) (Early Model 124-000384) | 3- 7 |
| 3- 7 | Rhythm Tracks and Variation Chart | | 3- 8 |

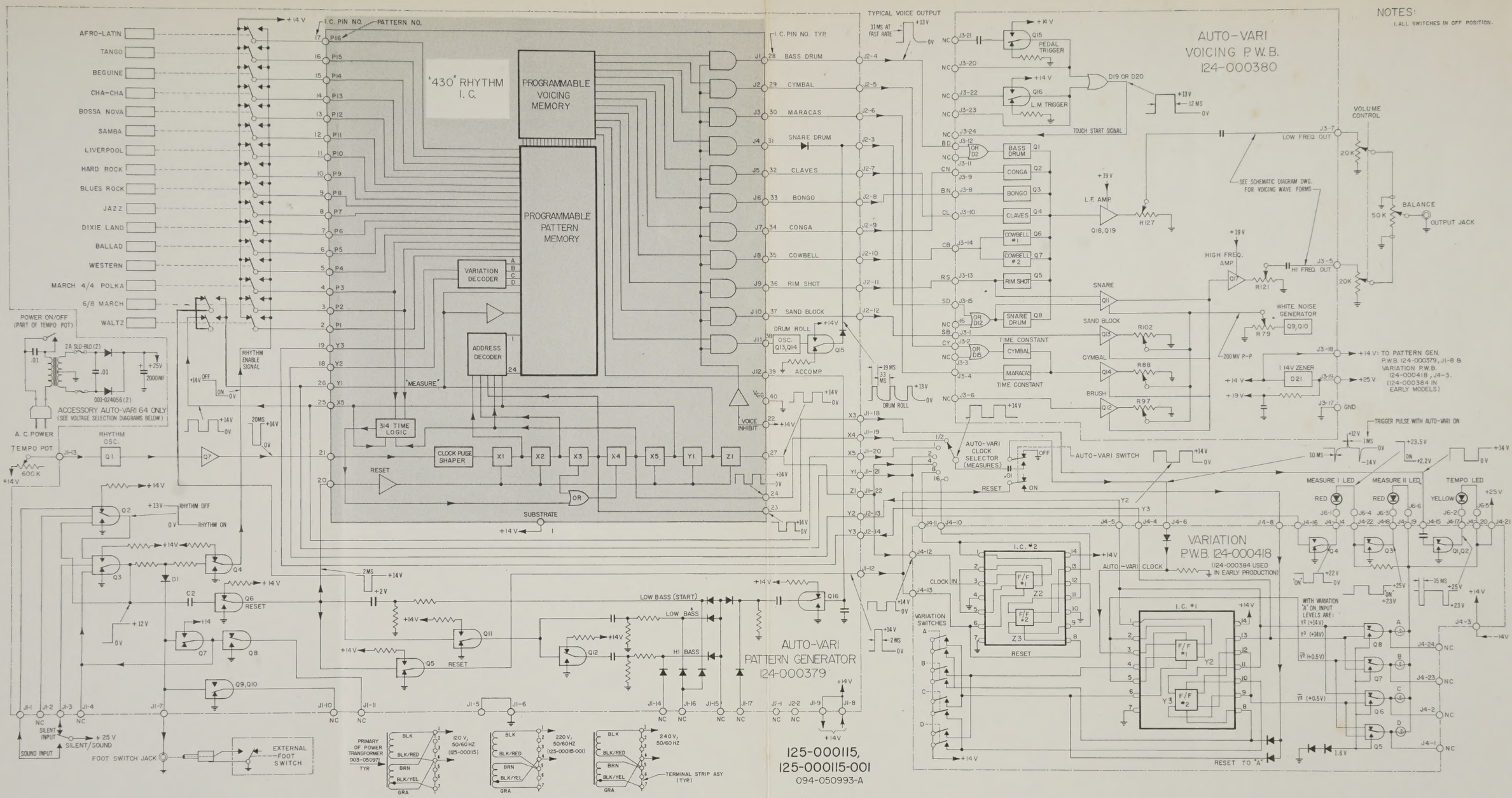
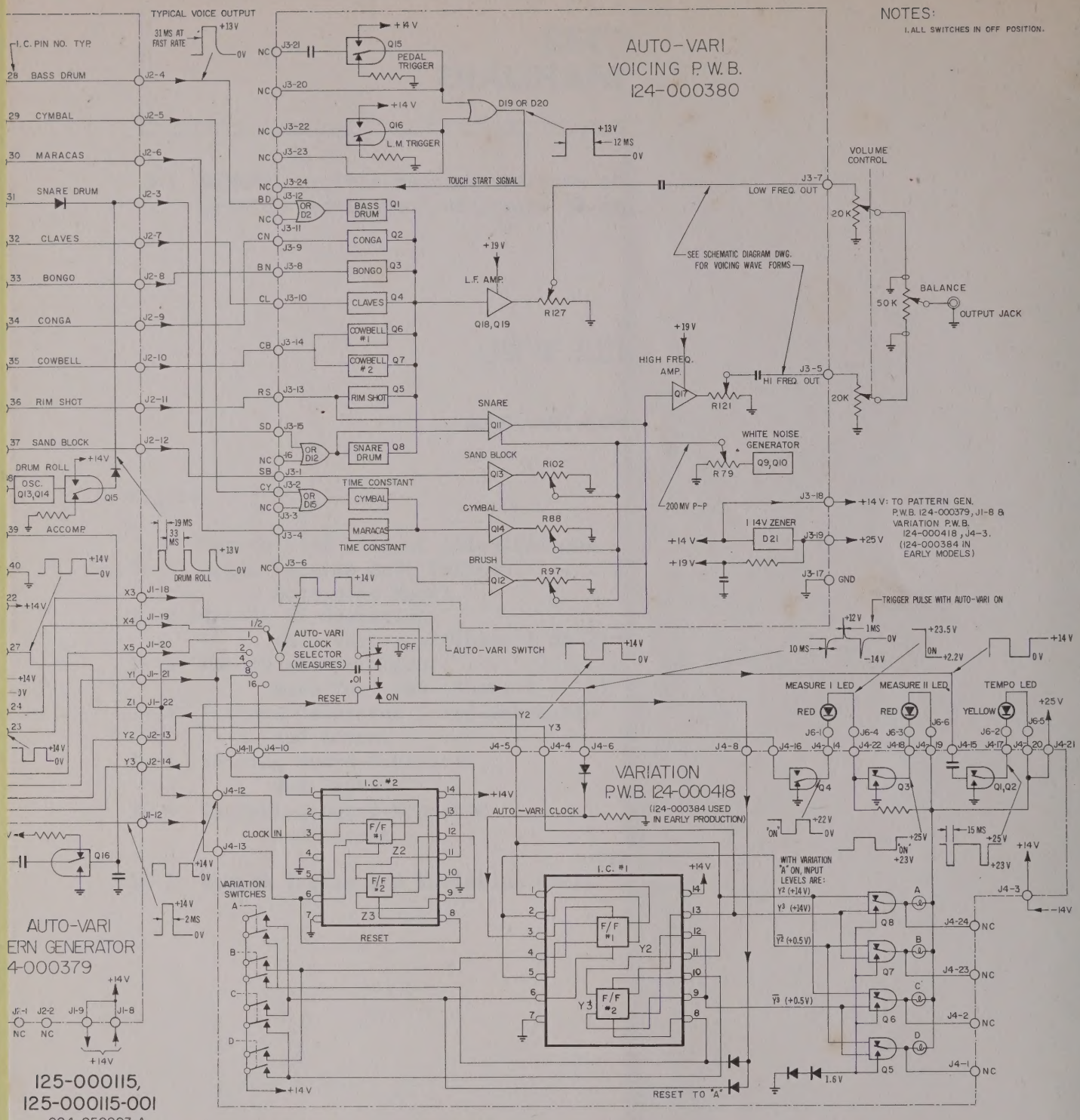



FIGURE 3-1
ACCESSORY MODEL
LOGIC DIAGRAM
AUTO VARI - 64


AUTO-VARI
VOICING P.W.B.
124-000380
NOTES:
1. ALL SWITCHES IN OFF POSITION.
TYPICAL VOICE OUTPUT
31 MS AT FAST RATE
+13 V
0V
I.C. PIN NO. TYP.
28 BASS DRUM
29 CYMBAL
30 MARACAS
31 SNARE DRUM
32 CLAVES
33 BONGO
34 CONGA
35 COWBELL
36 RIM SHOT
37 SAND BLOCK
DRUM ROLL
39 ACCOMP.
40
22
27
24
23
J2-4
J2-5
J2-6
J2-3
J2-7
J2-8
J2-9
J2-10
J2-11
J2-12
J1-18
J1-19
J1-20
J1-21
J1-22
J2-13
J2-14
J1-12
J1-8
J1-9
J2-1
J2-2
NC
+14 V
PEDAL TRIGGER
Q15
L.M. TRIGGER
Q16
D19 OR D20
12 MS
TOUCH START SIGNAL
J3-21
J3-20
J3-22
J3-23
J3-24
J3-12
J3-11
J3-9
J3-8
J3-10
J3-14
J3-13
J3-15
J3-2
J3-3
J3-4
J3-6
OR D2
BASS DRUM Q1
CONGA Q2
BONGO Q3
CLAVES Q4
COWBELL #1 Q6
COWBELL #2 Q7
RIM SHOT Q5
OR D12
SNARE DRUM Q8
OR D15
CYMBAL
MARACAS
TIME CONSTANT
L.F. AMP.
Q18, Q19
R127
+19 V
SEE SCHEMATIC DIAGRAM DWG. FOR VOICING WAVE FORMS
VOLUME CONTROL
20K
LOW FREQ. OUT
J3-7
BALANCE
50K
OUTPUT JACK
HIGH FREQ. AMP.
Q17
R121
HI FREQ. OUT
J3-5
SNARE
Q11
WHITE NOISE GENERATOR
Q9, Q10
R79
SAND BLOCK
Q13
R102
CYMBAL
Q14
R88
BRUSH
Q12
R97
200 MV P-P
J3-18
+14 V: TO PATTERN GEN. P.W.B. 124-000379, J1-8 & VARIATION P.W.B. 124-000418, J4-3. (124-000384 IN EARLY MODELS)
1 14V ZENER
D21
J3-19
+25 V
J3-17
GND
OSC. Q13, Q14
Q15
19 MS
33 MS
DRUM ROLL
TRIGGER PULSE WITH AUTO-VARI ON
+12 V
1 MS
10 MS
-14 V
+23.5 V
ON
+2.2 V
AUTO-VARI CLOCK SELECTOR (MEASURES)
1/2
OFF
ON
RESET
AUTO-VARI SWITCH
.01
MEASURE I LED
MEASURE II LED
TEMPO LED
RED
YELLOW
+25 V
J6-1
J6-4
J6-3
J6-6
J6-2
J6-5
Y1
Y2
Y3
Z1
J4-11
J4-10
J4-5
J4-4
J4-6
J4-8
J4-16
J4-14
J4-22
J4-18
J4-19
J4-15
J4-17
J4-20
J4-21
Q4
Q3
Q1, Q2
VARIATION P.W.B. 124-000418
(124-000384 USED IN EARLY PRODUCTION)
AUTO-VARI CLOCK
+22 V
"ON"
+25 V
+23 V
15 MS
I.C. #2
F/F #1
F/F #2
Z2
Z3
CLOCK IN
J4-12
J4-13
VARIATION SWITCHES
A
B
C
D
I.C. #1
Y2
Y3
WITH VARIATION "A" ON, INPUT LEVELS ARE:
Y2 (+14 V)
Y3 (+14V)
Y2 (+0.5 V)
Y3 (+0.5V)
Q8
Q7
Q6
Q5
J4-3
J4-24
J4-23
J4-2
J4-1
NC
1.6 V
RESET TO "A"
AUTO-VARI
ERN GENERATOR
4-000379
2 MS
125-000115,
125-000115-001
094-050993-A